CITY OF FRESNO

FAX
FRESNO AREA EXPRESS

2001 Transit Long Range Master Plan

Final Report

Submitted by:

nelson\nygaard consulting associates

& TJKM

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ACKNOWLEDGEMENT PAGE

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Executive Summary

INTRODUCTION

The City of Fresno, located in the southern portion of the Central Valley, is one of the fastest growing cities in California. With a population of over 420,000, Fresno is now the State's sixth largest city. Combined with the City of Clovis, and the adjoining unincorporated communities, the current (January 2001) Fresno-Clovis Metropolitan Area population is nearly 600,000[1].

Fresno, like other Central California cities, is expected to continue experiencing a high rate of growth and development over the next twenty years. This growth will bring both opportunities (new jobs, new housing and increased prosperity) and problems (increased traffic congestion, air pollution and general over-crowding).

The Fresno urban area is no stranger to some of these problems. Fresno has experienced explosive growth, especially in the northern neighborhoods abutting Herndon Avenue. On one hand this growth has been good because it has increased the stock of affordable housing and it has created thousands of jobs in construction related industries. On the other hand, the increase in automobile traffic associated with this growth is having a direct impact on both traffic congestion (collector streets and arterials) and air pollution.

Will things get worse? The population of the metro area is expected to surpass 1 million within the next twenty years[2]. According to the Council of Fresno County Governments (COFCG) travel model, traffic congestion throughout the metro area will reach a "significant" level by 2010 and "serious" level by 2020.

Increased congestion impacts not just cars but transit buses as well. How? – An increase in congestion increases the time it takes for a bus to make a round-trip, which in turn increases the number of buses needed <u>just to maintain the current level of service</u>. In other words, it ends up costing more to keep doing the same thing! Even a small decrease in the average speed along a corridor can translate into the need for one or two extra buses on a route. This in turn can increase annual operating costs by several hundred thousand dollars. In the near future as much as 25% of a bus' total round-trip travel time could be spent waiting at red lights or creeping along in stop and go traffic.

Fresno Area Express

Fresno Area Express (FAX) is the city's public transit system. Its mission statement is *"…to provide a comprehensive transportation system that improves the quality of life in our community."* FAX operates fixed route and paratransit service seven days a week. The fixed route system has 17 routes and carries over 12 million passengers per year. Most of

[1] Source: State of California Department of Finance (1/1/01).
[2] Source: Council of Fresno County Governments (5/101).

the fixed route network is within the city limits, although FAX does operate some service to the neighboring city of Clovis. The majority of routes operate on 30-minute headways on weekdays. Weekend headways vary from 30 to 60 minutes depending upon the route. The system has two main transfer centers: Downtown Fresno (Courthouse Park) and Manchester Mall.

Ridership has increased by nearly a third over the last two years. In fact, peak loads have reached a point where the City is now considering adding articulated buses to handle the overflow.

Purpose of this plan

The Fresno Area Express (FAX) Long Range Transit Master Plan provides a vision of what public transit might/should look like in twenty years based on adopted regional and local goals and objectives[3]. The Plan presents an evaluation of current and future transit needs and issues, plus recommendations for creating a system to address those needs in an effective and efficient manner.

The Plan has two primary components:

- A Long Term (2020) vision for public transit
- A Short Term Plan that supports the longer term vision[4].

Key Issues and Findings

Our work on this study identified a number of interesting issues and questions such as:

1. The current FAX transit network, like many others in similar areas around the country, is one which primarily addresses social service transportation needs. The typical FAX passenger tends to come from a transit dependent household and has few if any options to taking the bus.

   If public transit is going to play a serious role in addressing mobility and air pollution problems then the system will likely need to be structured, or restructured, in a manner that can attract choice riders[5]. In other words, it must become more competitive with the auto.

   Assuming that resources are fairly limited, shifting the service objectives of the transit system could result in the need to make some difficult trade-offs. Transit systems that are designed to be competitive with the auto are not always appropriate for serving

[3] The last update of the plan was completed in 1994 by Wilbur Smith Associates.
[4] FAX transit staff regularly prepare a separate Five Year Short Range Transit Plan (SRTP). An update of the SRTP is scheduled to be released during the Fall of 2001, immediately following the completion of this Transit Master Plan.
[5] Choice riders are typically defined as those individuals who do not have to rely upon public transit to meet their mobility needs. Instead, if they use transit, it's often because they choose to do so. In most cases, choice drivers are those individuals who typically "drive alone" to their destination.

social service needs. This could become an issue for current riders and social service agencies. The question is then...*How will limited resources be distributed between competing needs?*

2. Designing a system that is competitive with the auto will mean significantly increasing service levels on many trunk routes. Property owners on the streets where these routes operate may complain that they will be negatively impacted by an increase in bus service (e.g., more noise, visual impact, etc.). This may make it difficult to undertake certain service improvements regardless of the perceived “public good.”

3. Several corridors within Fresno are good candidates for high frequency or even Bus Rapid Transit (BRT) service. These include Blackstone Avenue, Shaw Avenue (between Brawley and Clovis) and Ventura Avenue. Ventura Avenue might be the best of the three given the adjacent activity centers, the demographics of the surrounding neighborhoods and the overcrowding FAX currently experiences on Route 28.

   BRT projects are being viewed favorably by many communities throughout the US because they can significantly improve mobility without the need for a heavy capital intensive project like light rail transit.

4. Fresno County is one of California’s 16 so-called “Self-Help” counties that have regional sales taxes to support local transportation projects. Fresno's current Measure C sales tax is set to expire in 2007. The Council of Fresno County Governments intends to place a new Measure C expenditure plan on the ballot in 2002. It is expected that this measure could raise as much as $3.0 billion to support transportation projects over the twenty years of the sales tax.

   This Long Range Transit Master Plan will play an important role in identifying projects that may warrant further study and/or possible inclusion in the new Measure C.

What is Transit?

Chapter 6, *Transit’s Role in Urban Life*, presents a discussion of transit’s role in the community. While some transit systems began as private businesses, today's urban transit systems are usually thought of as part of the civic infrastructure -- essential public services like police, fire and water. Though transit requires public funding, the same can be said of all other transportation modes, whether it be the construction of roads for cars and trucks, lanes for cyclists, or sidewalks for pedestrians.

The role that is chosen for transit has a direct impact on the system’s productivity and efficiency. In most cities, transit exists to serve a diverse range of purposes, including community goals for environmental quality, redevelopment, and mobility for people who cannot drive, among many others. For local systems, the expectations that we place on transit tend to fall into two broad categories: Productivity and Coverage.

Productivity: Maximize Ridership Per Unit of Cost!

Productivity can mean maximum ridership per unit of service time (and hence of cost). While it is usually measured this way (as boardings per hour of service), some people prefer to think of operating cost per passenger. All of these measures are closely related and speak to how intensely the system is being used.

The Productivity goal is to maximize ridership per unit of cost. This goal actually encompasses several diverse purposes that happen to align with each other:

> **Vehicle Trip Reduction –** The more people transit is carrying, the fewer are driving. While many transit passengers may not be candidate drivers themselves, many would be chauffered to their destinations, generating auto trips if transit were not available.
>
> **Air Quality –** Obviously, this goes with vehicle trip reduction. In addition, because lower-income persons tend to drive older cars, attracting them to transit can improve air quality to a degree that is out of proportion to their numbers.
>
> **Minimizing Subsidy or "Running Transit Like a Business"** Although transit in the U.S. does not make money, a lower subsidy per rider obviously brings a system closer to self-sufficiency.[6]
>
> **Regional Redevelopment –** To the extent that the city wishes to encourage new development within the existing built form of the city, rather than just "greenfield" development that extends the city's area, a Productivity-oriented system is most likely to provide the services needed to support new density and infill, and mitigate the traffic impacts of such projects.

The key to a Productivity-oriented system lies in the idea of "running transit like a business." Any successful business chooses which customers it will pursue. For example, one of the nation's few profitable airlines, Southwest, does not serve cities below a certain size, because while those cities may have air travel needs, the market is not large enough to reliably fill their planes.

A Productivity-oriented system, then, will "choose its markets," running high-quality service where demand is high, and little or no service where demand is low. Obviously, since transit is a public service paid for by all taxpayers, the Productivity goal must be balanced against its opposite, the need to provide some benefit to everyone. The opposite of the Productivity goal is the Coverage goal described below. Every agency must strike a balance between them.

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[6] Again, self-sufficiency is not a realistic goal for any mode of transit, because the modes competing with it are so heavily subsidized.

Coverage: Provide Some Service to Everyone!

The Coverage goal reflects the desire to provide some service to everyone, even though some of this service will carry few riders. Coverage-oriented service penetrates parts of the community where transit cannot expect to operate with high productivity, either due to low densities or a built environment that is unsafe and unpleasant for pedestrians.

The Coverage goal is important to many constituencies, including:

Transit-dependent persons in low-density areas – Like many cities, Fresno houses some of its lower-income residents in sparsely populated, semi-rural areas. Isolated apartment buildings and mobile home parks form small pockets of demand, but their remoteness makes them unproductive to serve.

Major destinations and residences in transit-inaccessible areas – Herndon Avenue is a classic example of a street where there are many places people might want to go on transit – including medical destinations and employers – but the physical configuration of the street makes it impossible to site safe and comfortable transit stops. As a result, transit must meander on side streets, yielding slow and expensive operations that will not attract many riders.

Social Services – To the extent that major social services have located on inexpensive land in remote areas, the trips to these services become expensive and unproductive for transit to serve. Social service agencies are frequently located in industrial parks, minor strip malls, and other locations that are often far from transit, which forces transit to make awkward deviations to serve them, pulling down productivity.

Some Senior and Disabled Constituencies – While it is possible to create a Productivity-oriented service that will attract senior and disabled riders, these groups have a lower tolerance for walking or wheeling themselves to a transit stop. A Productivity-oriented system typically spaces transit lines about every 1/2 mile, with the understanding that most customers will walk up to 1/4 mile to transit. However, senior and disabled communities sometimes demand services that are closer together, even though these services are inevitably less productive because the markets of parallel lines overlap.

Local Development and Redevelopment – While regional goals for redevelopment are well-met by a Productivity-oriented system, constituents who have a financial or personal stake in a particular development may demand service to their neighborhood or project, regardless of whether this service is productive by regional standards. A great deal of Coverage-oriented, low-ridership service is often created for this reason.

SHORT TERM SERVICE SCENARIOS

At the direction of FAX staff,[7] Nelson\Nygaard prepared two scenarios for how the Fresno Area Express system might look in 2005. Both scenarios assumed a 25% growth in operating resources. Staff directed that these scenarios differ by purpose:

> **Scenario A** is devoted solely to the goal of Productivity. It focuses all resources toward maximizing systemwide ridership, with the benefits indicated. As a result, it cuts service to some areas that currently generate low ridership, while increasing the frequency of service to every 15 minutes all day in areas of high ridership. This scenario would increase not just ridership, but also productivity. That is, the percentage increase in ridership will be substantially greater than the percentage increase in service. For a 25% increase in service and a system solely devoted to Productivity, ridership growth in the range of 35-50% is conceivable.
>
> **Scenario B** retains coverage to all areas now served, and even expands the coverage area to include most developed parts of the city. Relatively few improvements are made to increase Productivity, though some frequencies are improved. About 12% of the system is devoted to Coverage in this scenario. This scenario is likely to increase the growth rate in ridership slightly, but not nearly to the level that Scenario A would do.

The system maps for Scenarios A and B are shown in Figures ES-1 and ES-2 respectively.

[7] Meeting between Nelson\Nygaard and FAX senior staff (8/14/01).

Figure ES-1 Scenario A – Fixed Route System (Maximum Productivity)

Figure ES-2 Scenario B – Fixed Route System (Citywide Coverage)

Long Term Strategies

Chapter 8 presents several possible strategies that the region could follow in accommodating the growth of travel demand. Each offers a different response to a variety of important planning issues and assumptions. They are presented in order of the level of effort cost involved.

1. Implement 2005 Service Plan (Scenario A or B), then grow service only as current funding sources permit. This approach presumes that the 30% growth in travel projected for the region will occur overwhelmingly in the form of single-occupant auto trips.
2. Aggressively seek funding for a major expansion and "reinvention" of the rubber-tired transit system. While some Fresno residents may not be willing to ride anything that looks remotely like a bus, these improvements would dramatically increase ridership among lower and middle-income groups, and provide service that would appeal to at least some riders who have the choice of driving.
3. Aggressively seek funding for major fixed guideway transit projects, such as monorail or light rail. If successful, this strategy could produce a major shift toward transit and away from the auto, and would tend to attract riders from across the socioeconomic spectrum.

Choosing a Future

These scenarios lay out some of the tradeoffs of what are really two independent questions:

- Should new local funding sources be sought to dramatically improve the transit system, not just in quantity but in its attractiveness to the community? A "no" to this question means an acceptance of 30% growth in vehicular traffic over the next 20 years, and greater obstacles to enhancing inner city areas such as downtown and the Tower District. It also means accepting that the transit system will fail to keep up with demand as the region grows.

- If new funding is approved, should the focus be primarily on reinventing the bus service, or on more expensive projects such as light rail or monorail?

Both of these are political decisions that will be made based on many factors <u>beyond</u> those covered in this report. Our only technical conclusion is as follows:

> Based on currently known technology and costs, the most cost-effective transit system of the future would be a dramatically expanded one focusing on the high-density area of the city (roughly the area of Scenario A, expanded into the areas noted in the figure at the beginning of this chapter), along with the "reinvention of the bus" options outlined above.

Regardless of whether Fresno moves toward rail in the future, the next decade or so is likely to be a period of increasing demand in the bus system. Chapter 9 provides a set of policy recommendations which focus around the creation of a Primary Transit Network (PTN). The primary goal of the PTN is to ensure that the City receives the maximum possible benefit from its transit investment, consistent with other city goals.

The PTN is a network of services that run every 15 minutes or better all day. Several of the routes in Scenarios A and B fit this definition. Although the PTN works together with other services, it differs profoundly from the rest of the system in two several key respects:

- **Ridership and Productivity Potential –** The 15-minute headway represents the point at which you no longer need to consult a schedule to use the service. It also permits transfers to be made rapidly even without timing of connections. For these reasons, these lines have the greatest ridership potential

- **Magnified Effect of Small Changes –** On the PTN, the agency makes its most concentrated investment. Because of this, any changes that affect transit operations or attractiveness will be magnified. An amenity – such as a shelter – placed on the PTN will probably be used by more people, and will therefore have a greater positive impact, than the same shelter placed elsewhere. On the other hand, a delay imposed on a PTN line will cost the City more, in terms of both running time and ridership, than the same delay imposed on a less frequent service.

- **Potential Synergy with Land Use –** The level of service offered by the Primary Transit Network makes it possible, even convenient, to live without a car, or to have fewer cars than adults in a household, or for a business to require fewer parking spaces. The PTN is also the most cost-effective place to site any new transit-dependent development, in terms of transit costs, because a high level of service is already there. In general, the PTN requires density to support the high level of service, and it also provides the opportunity for further densification.

Chapter 9 explores four areas of policy that apply particularly to the Primary Transit Network, though many are also relevant to less frequent lines:

1. Protecting the PTN's Speed and Reliability
2. Marketing the PTN for Maximizing Ridership
3. Enhancing Ridership through Land Use Synergies
4. Expanding the PTN in Concert with Development

PUBLIC OPEN HOUSE

On Monday December 17th, 2001, staff from FAX and Nelson\Nygaard held a Public Open House in the lobby of the Fresno City Hall. The purpose of this meeting, which lasted from 4:00 pm to 8:00 pm, was to provide the public with an opportunity to comment on the Draft Final Plan.

The event was well received. Approximately fifty people stopped by the Open House to view the displays, pick-up handouts and talk to staff. Information was made available regarding the proposed long and short-term plans, service planning objectives and important findings from the study. In addition to members of the general public, the attendees also included representatives from the Fresno City Council, Fresno Council of Governments, League of Women Voters, and Fresno Area Residents for Rail Consolidation. There was also a reporter from the local television station.

AN OPPORTUNITY FOR RESHAPING DOWNTOWN FRESNO

As the City ponders the future of its transit system, it should also give some thought to the role the system can play, both directly and indirectly, in reshaping and revitalizing Downtown Fresno. The Mayor and the City Council have recently expressed an interest in revitalizing Downtown. This plan, though still very conceptual at this point, focuses on bringing new businesses and as many as 10,000 new residents into the greater downtown area.

This raises an important question – What role can transit play in making the downtown a more inviting area for new residents and businesses?

Certainly a more expansive, frequent and attractive transit system can play an important role in bringing people to and from the downtown. But what happens while they are actually “in” downtown. Can transit help improve the environment? The answer is definitely yes. How might this be accomplished? Through the creation of a new transit center and the enhancement of adjacent pedestrian facilities.

The existing transit/transfer center occupies three sides of Courthouse Square. This facility was designed and constructed in the late 1970s. Few people, if any, would currently say that this center is either customer friendly or attractive. Replacing this outmoded facility with a new center would benefit both exiting riders and non-riders.

A detailed study of transit center locations and amenities is well beyond the scope of this Long Range Transit Master Plan. However, it is an important need and one which the City should undertake as soon as possible. Nelson\Nygaard staff has had an opportunity to “brainstorm” about the transit center issue. Here are some of our thoughts.

The City, along with private parties, is already taking some steps to revitalize downtown. On the southside of town a new baseball stadium, set to open in 2002, is being constructed for the Fresno Grizzlies at the intersection of Tulare and “H” Streets. On the northside, Fresno Community Hospital is enhancing its facilities near the intersection of Fresno and Divisadero.

Right in the middle of downtown is the existing transfer center. Development of a new facility, coupled with improvements to the pedestrian environment, would provide the City with a unique opportunity to create a "linked" and attractive downtown setting.

Here is one possibility. The City might consider moving the transfer center, and all of its related activities, from its current location to a new Transit Mall site on "M" Street between Fresno and Tulare. This stretch of M Street would be closed to automobile traffic (excluding emergency vehicles). Some driveways and access points for buildings along this stretch of M would have to be moved or reconfigured.

Buses would enter the M Street Mall from either Fresno or Tulare Streets. The existing traffic lights at each end of this block would be reprogrammed to accommodate bus access.

Buses would stop along both sides of the malls. An attractive median, with a low fence, down the center of M Street would separate the two sides of the mall, and would force patrons to cross between sides only at designated crosswalks.

The sidewalks and curbs would be reconfigured to allow for sawtooth bus bays. Sawtooth bays would allow buses to pull in and out of spaces without having to wait for other buses to move.

Sidewalks would receive new pavement treatments. Unique and attractive bus shelters would be installed at every space. These shelters could have digital message signs announcing arrivals. They could also have "misters" to cool passengers during summer periods of intense heat.

The Mall would have plenty of lighting to ensure safety. Furthermore, the site is adjacent to the Fresno County Sheriff's department, providing more opportunities for police foot patrols of the area. If desired, a small, manned, FAX ticket and information booth could be provided near the center of the mall. This could be staffed by volunteers from the Senior Center or some other non-profit organization.

The important thing to remember is that this kind of a transit mall project does not have to involve a huge capital outlay. Most of the improvements are relatively inexpensive and easy to accomplish in a short time period.

A new transit facility would go a long way towards creating a more inviting environment for bus passengers. But there's more to the project than just the transit mall. Moving the transfer center would also provide the City with an opportunity to refurbish Courthouse Square and turn it into an attractive, multi-function downtown park. Finally, the transit mall project would provide an opportunity to create a new pedestrian environment connecting the baseball stadium, Fulton Mall, Courthouse Square, Transit Mall, City Hall and Fresno Community Hospital.

REPORT FORMAT

This report is divided into nine chapters plus several appendices. Following this Executive Summary are:

Chapter 1 System Overview

This chapter provides an overview of the FAX fixed route and Handy Ride demand-responsive services. The chapter includes a discussion of system operating characteristics, system performance, and for the fixed route operation a comparison of route by route performance.

Chapter 2 Population and Employment Densities

Chapter 2 presents Nelson\Nygaard's unique method of looking at present and future transit demand. N\N has discovered that density of development, both residential and employment, tends to be the factor having the greatest impact on transit demand and usage in metropolitan areas. This chapter is centered around three graphics: 1) population-employment density in Year 2001, 2) population-employment density in Year 2020 and 3) a comparison of FAX service levels and 2001 population-employment density.

Chapter 3 Origin-Destination Travel Patterns

TJKM Transportation Consultants has worked with staff at the Council of Fresno County Governments (COFCG) to prepare estimates of travel between 84 origin-destination "Superzones" for Years 2001, 2010 and 2020, Chapter 3 provides an in-depth look at the results.

Chapter 4 Planning Context

N\N has conducted an extensive amount of document review and outreach (stakeholders and bus operators). The important findings from this effort are documented in Chapter 4.

Chapter 5 Summary of Important Findings and Service Planning Issues

This chapter pulls together all of the important findings and presents a list of issues that served as the foundation for the service planning effort.

Chapter 6 Transit's Role in Urban Life

What is transit for? Is it to provide mobility for the transit dependant or is it to be competitive with the auto? Perhaps it's a combination of the two. Chapter 6 provides an interesting discussion of transit's "perceived" purpose.

Chapter 7 Short Term (2005) Scenarios

Chapter 7 outlines two strategies for moving the fixed route system into the future: one scenario reflects a coverage approach and the other is based on productivity.

Chapter 8 Long Term Plans

The Long Term Plan provides an overview of three possible scenarios: 1) Steady State 2) Reinvented Bus and 3) Rail.

Chapter 9 Policy Recommendations

This last chapter offers some policy recommendations which are geared towards making transit more effective and communities more livable.

Appendix A

This appendix contains maps depicting 1999 residential density by TAZ, 1999 employment density by TAZ, 2020 residential density by TAZ, and 2020 employment density by TAZ.

Appendix B

This appendix contains route-by-route descriptions, including boarding maps overlaid on residential and employment densities by TAZ.

Chapter 1. System Overview

This chapter has three sections. The first provides a description of the fixed route, paratransit and adjacent transit systems. The second provides a summary of recent performance. The third presents an overview of route-by-route boardings and productivity.

SYSTEM DESCRIPTION

FAX Fixed Route Service

FAX operates fixed route service along a modified grid network pattern with intersecting north-south and east-west bus lines. Service operates seven days a week with 18 routes that carry over 12 million passengers a year. Most of the service is within the city limits, though FAX does operate some connecting service to the adjacent City of Clovis. The majority of routes operate on 30-minute headways on weekdays, with 30 to 60-minute headways on weekends, depending upon the route. Almost all routes connect to one or both of the main transfer centers: downtown Fresno (Courthouse Park) and Manchester Mall. FAX routes are shown in Figure 1-1. Service hours and frequency by route are shown in Figure 1-2.

Figure 1-1 FAX Fixed Route System

[Graphics file]

Figure 1-2 FAX Weekday Service Hours and Frequency by Route

Line	Name	Frequency			Weekday Route Start	Weekday Route End
		Peak	Base	Eve		
9	Shaw Avenue Crosstown	30	30	30	5:40 AM	10:30 PM
20	Hughes, Marks, Olive	30	30	30	5:10 AM	10:20 PM
22	N. West Ave/East Tulare Avenue	30	30	30	5:20 AM	10:30 PM
26	N. Palm/Beach Ave.	30	30	30	5:55 AM	10:45 PM
28	CSUF/Manchester/Ventura	30	30	30	5:45 AM	11:35 PM
29	UMC/Downtown/MTC/CSUF	80	80	80	6:45 AM	6:10 PM
30	Pinedale/Blackstone/West Fresno	20	20	30	5:45 AM	10:05 PM
32	N. Fresno/Manchester/W. Fresno	30	30	30	5:55 AM	10:45 PM
33	Olive/Belmont Crosstown	35	35	35	6:00 AM	10:15 PM
34	NE. Fresno/North 1st/W. Fresno	30	30	30	5:40 AM	10:10 PM
38	N. Cedar/Jensen/Hinton Center	30	30	30	5:45 AM	11:10 PM
39	Clinton Avenue Crosstown	30	30	30	5:30 AM	10:20 PM
41	N. Marks Avenue/Shields/VMC	30	30	30	5:40 AM	10:35 PM
45	Ashlan Crosstown	60	60	60	6:00 AM	9:00 PM
58	NE Regular Service	60	60	60	6:50 AM	6:40 PM
58E	Valley Children's Hospital Express	60	60	60	6:20 AM	6:10 PM
59	VCH/Marketplace/MTC Express	60	60	60	11:00 AM	6:25 PM

Ridership has increased by at least 500,000 passengers per year since FY 1996/97 and shows no signs of slowing. Peak loads have increased to the point where several routes regularly have standing loads. Packed buses with large standing loads have become common enough that FAX has ordered some articulated buses that will go into service in the near future.

Handy Ride Paratransit Service

Handy Ride demand-responsive paratransit service is the 100% compliant ADA complement to FAX fixed route service. Laidlaw Contract Services operates all Handy Ride vehicles. Handy Ride service hours closely follow the service span of FAX with weekday service from 5:20 AM to 10:30 PM and weekend service from 6:15 AM to 7:15 PM.

Fare Structure

Figure 1-3 shows the current FAX and Handy Ride Fare Schedules. The last fare increase was implemented January 1, 1991. FAX is currently considering raising the base fare to $1.00, along with similar changes to the rest of the fare structure.

Figure 1-3 FAX and Handy Ride Fare Schedules

	Fresno Area Express	Handy Ride
Base Fare	$0.75	$3.75
Elderly and Disabled Fare	$0.35	$0.75
Express Bus Fare	$1.00	N/A
E&D Express Bus Fare	$0.50	N/A
Tokens	$0.60	N/A
Monthly Convenience Pass	$25.00	$25.00
Senior Citizen Pass	$10.00	N/A
Special Rider Pass	$10.00	N/A
Transfers	Free	N/A
Transfers to Express Bus	$0.25	N/A

Source(s):
FAX Schedule Guide (1/8/2001)
FAX 2000-2005 Short Range Transit Plan

Fleet Inventory

Figure 1-4 shows the current FAX and Handy Ride Fleet Inventory. FAX and Handy Ride have vehicle reserves of 29% and 15% respectively. Most transit agencies consider 20% an ideal reserve while ten percent is considered adequate.

Figure 1-4 FAX and Handy Ride Fleet Size and Peak Pullout

	Fresno Area Express	Handy Ride
Total Fleet Vehicles	108	23
Active Fleet Vehicles	108	23
Peak Period Pullout	84	20
Reserve Ratio	29%	15%

Source(s):
Revenue Vehicle Inventory (10/27/2000)
Note(s):
Reserve Ratio is calculated by subtracting the Peak Period Pullout from the -
Active Fleet Vehicles and dividing this number by the Peak Period Pullout

Adjacent Transit Services

Transit services adjacent to the Fresno Area Express include Clovis Transit and numerous local agencies organized under the umbrella of the Fresno County Rural Transit Agency. These services are discussed briefly.

Clovis Transit

The City of Clovis operates two public transit services. Clovis Stageline provides general public fixed-route service and Clovis Roundup provides a specialized service for the elderly and disabled residents of Clovis. The primary connection between Clovis and Fresno transit is provided by FAX Route 28. Through a contractual agreement, the City of Clovis pays for part of the operating cost for FAX Route 28. In addition, the Clovis Roundup and Fresno Handy Ride services will refer riders from either system if unable to accommodate a trip request.

Clovis Stageline service runs during weekdays from roughly 6:45 AM to 7:00 PM. Annual passenger boardings are around 95,000. The Clovis Roundup offers service Monday through Friday from 6:15 AM to 6:15 PM and on Saturday from 10:00 AM to 4:00 PM. Roundup averages about 30,000 passengers per year.

Fresno County Rural Transit Agency

The Fresno County Rural Transit Agency (FCRTA) is the primary provider of public transit services to the rural areas of Fresno County. The FCRTA is responsible for the overall administration and financial supervision of the general public operations. The FCRTA consists of 17 rural subsystems which function using either city staff, private contractors or private non-profit contracts through the Rural Consolidated Transportation Service Agency

(Rural CTSA). The cities are all linked to the Fresno-Clovis Metropolitan area through direct connections or links with other rural cities.

SYSTEM PERFORMANCE

This section presents FAX and Handy Ride system operating data and performance statistics for the previous five fiscal years. Data for the first half of the current fiscal year 2000/2001 are extrapolated to a full year for comparison purposes. FAX fixed route performance is presented first, followed by a section on Handy Ride. In each section, a summary table is followed by graphs and discussion of individual performance indicators.

FAX Fixed Route Performance Trends

Figure 1-5 shows the combined operating statistics and performance indicators for FAX's fixed route system during the current (2001) and past five fiscal years (FY 1996/2000).

Figure 1-5 FAX Operating Data and Performance Indicators

	1995/1996	1996/1997	% Change (95/96-96/97)	1997/1998	% Change (96/97-97/98)	1998/1999	% Change (97/98-98/99)	1999/2000	% Change (98/99-99/00)	2000/2001 (Estimated)
Operating Data										
Operating Cost	$14,992,336	$17,161,083	14.5%	$16,526,236	-3.7%	$18,522,327	12.1%	$21,957,659	18.5%	$21,569,174
Passenger Boardings	9,225,096	9,545,574	3.5%	10,399,087	8.9%	11,021,716	6.0%	12,419,412	12.7%	12,937,398
Revenue Miles	3,048,962	3,050,894	0.1%	3,061,294	0.3%	3,281,329	7.2%	3,966,338	20.9%	4,001,702
Revenue Hours	221,384	221,373	0.0%	222,152	0.4%	241,904	8.9%	295,265	22.1%	298,444
Farebox Revenue	$4,501,850	$4,737,084	5.2%	$5,368,930	13.3%	$5,707,458	6.3%	$6,353,669	11.3%	$6,336,742
Performance Indicators										
Cost/Passenger	$1.63	$1.80	10.6%	$1.59	-11.6%	$1.68	5.7%	$1.77	5.2%	$1.67
Cost/Mile	$4.92	$5.62	14.4%	$5.40	-4.0%	$5.64	4.6%	$5.54	-1.9%	$5.39
Cost/Hour	$67.72	$77.52	14.5%	$74.39	-4.0%	$76.57	2.9%	$74.37	-2.9%	$72.27
Passengers/Mile	3.03	3.13	3.4%	3.40	8.6%	3.36	-1.1%	3.13	-6.8%	3.23
Passengers/Hour	41.67	43.12	3.5%	46.81	8.6%	45.56	-2.7%	42.06	-7.7%	43.35
Farebox Ratio	30.0%	27.6%	-8.1%	32.5%	17.7%	30.8%	-5.2%	28.9%	-6.1%	29.4%
Average Fare/Passenger	$0.49	$0.50	1.7%	$0.52	4.0%	$0.52	0.3%	$0.51	-1.2%	$0.49
Subsidy/Passenger	$1.14	$1.30	14.5%	$1.07	-17.6%	$1.16	8.4%	$1.26	8.1%	$1.18

Source(s):
Transit Productivity Evaluation FY 1999/2000.
Triennial Performance Audit of Fresno Area Express and Handy Ride for Fiscal Years 1994/1995 to 1996/1997.
Comparative Revenue and Passenger Analysis Reports 6/2000 to 12/2000.
Note(s):
YTD FY 2001 Includes data from July 2000 to December 2000.
YTD FY 2001 Operating costs were derived based on cost per revenue mile contained in the Fresno Area Express Cost Allocation Plan for Fiscal Year 1999 ($5.39).
New routes and service improvements in FY 1998/99 led to an increase in all operating statistics.
The addition of night service (7:00 PM to 10:00 PM) in FY 1999/2000 led to a significant increase in all operating statistics.

Passenger Boardings and Population

Passenger boardings are shown in Figure 1-6. FAX ridership increased steadily from 9.2 million in FY 1996 to nearly 13 million in FY 2001. The largest increase occurred from FY 1999 to FY 2000, when passenger boardings went up 1.4 million. This ridership increase corresponded with an increase in service (revenue hours and miles). The percentage growth in boardings compared to growth in population is shown in Figure 1-7. As seen in the figure, FAX percent growth in boardings per year is outpacing the percent growth in local population.

Figure 1-6 FAX Passenger Boardings FY 1996 to FY 2001

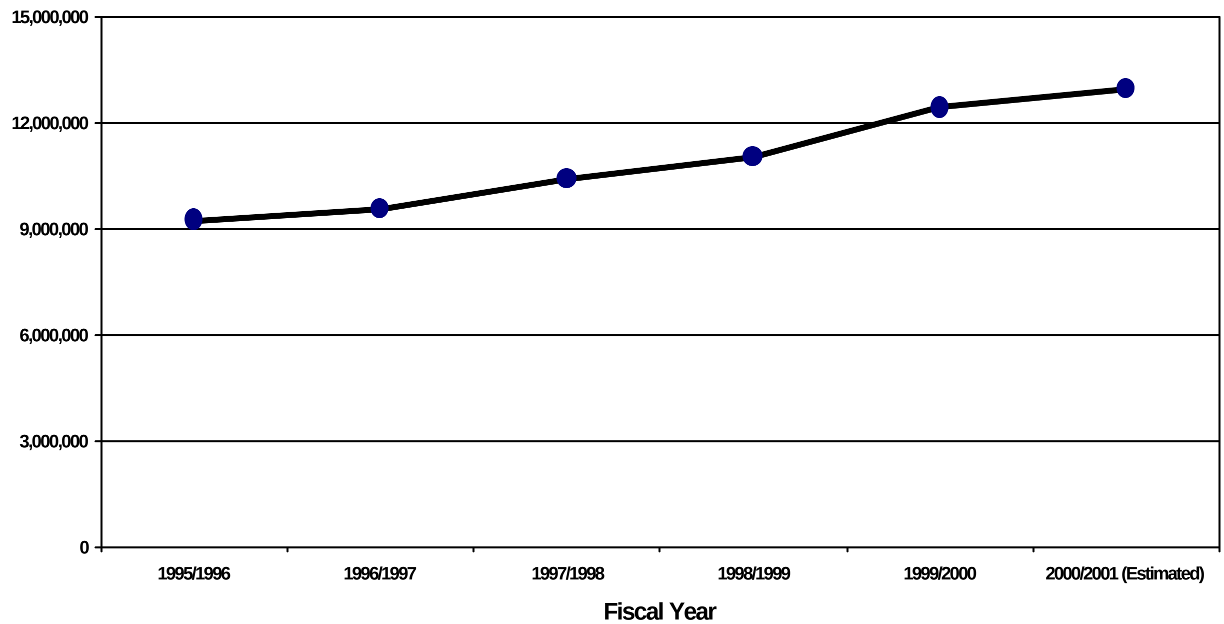
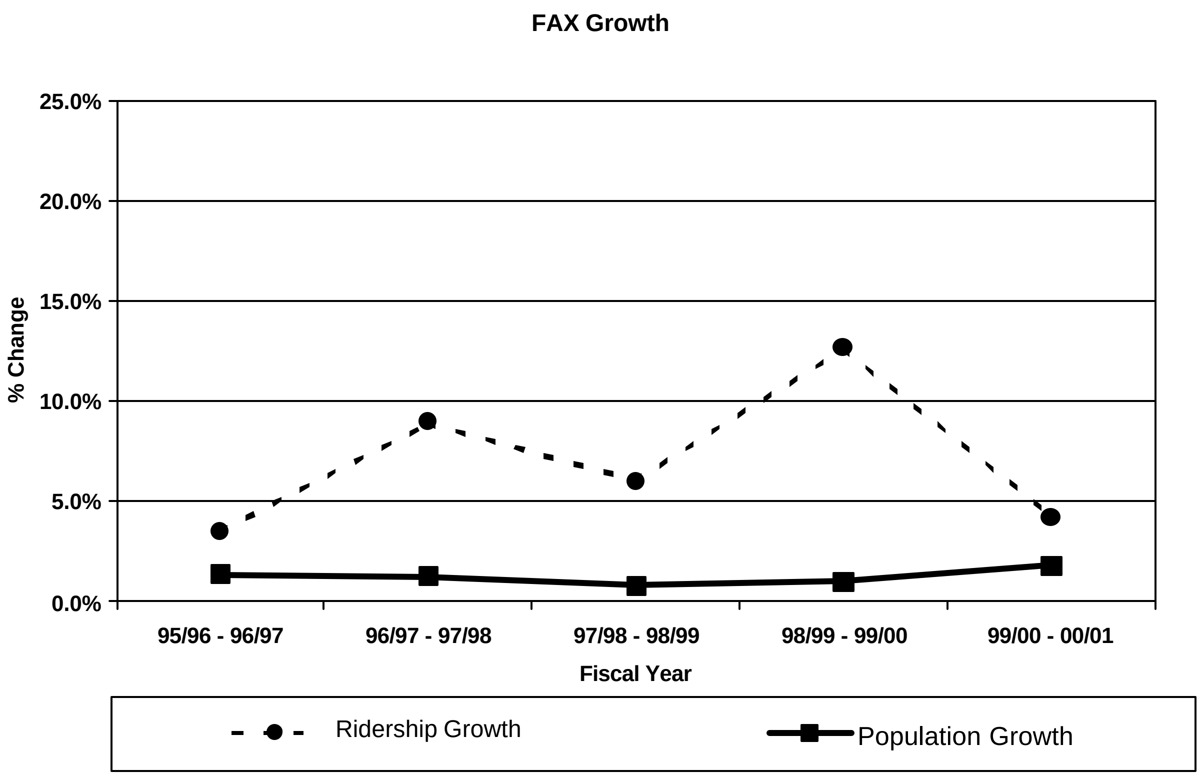


Figure 1-7 FAX Boardings and Fresno Population Growth

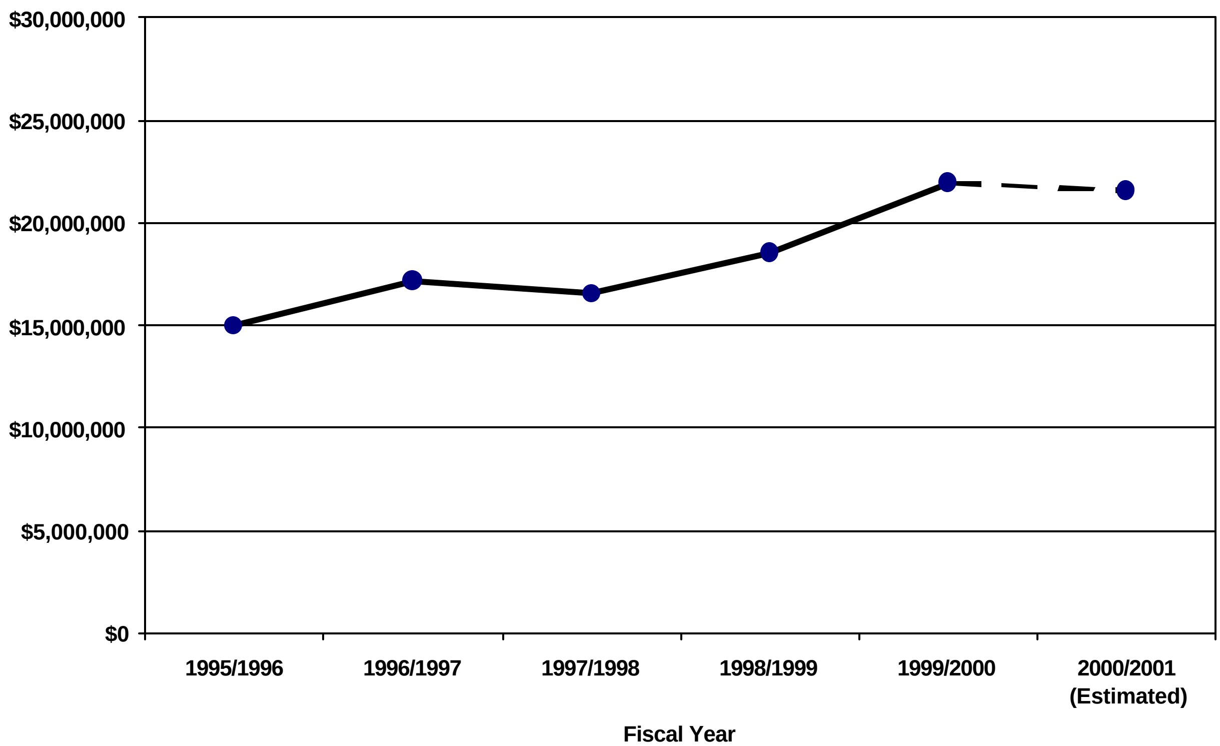


Over the last five years, growth in ridership has significantly outpaced the growth in population. This translates into an annual increase in ridership/capita.

Operating Cost

In FY 1996 FAX's operating costs were just under $15 million. Estimated operating costs for FY 2001 are over $21.5 million, an increase of over 40%. The most significant increase occurred from FY 1999 to FY 2000 when operating costs went from $18.5 million to just under $22 million. This increase can be attributed to additional weekend and evening service that added over 50,000 revenue service hours from FY 1999 to FY 2000.

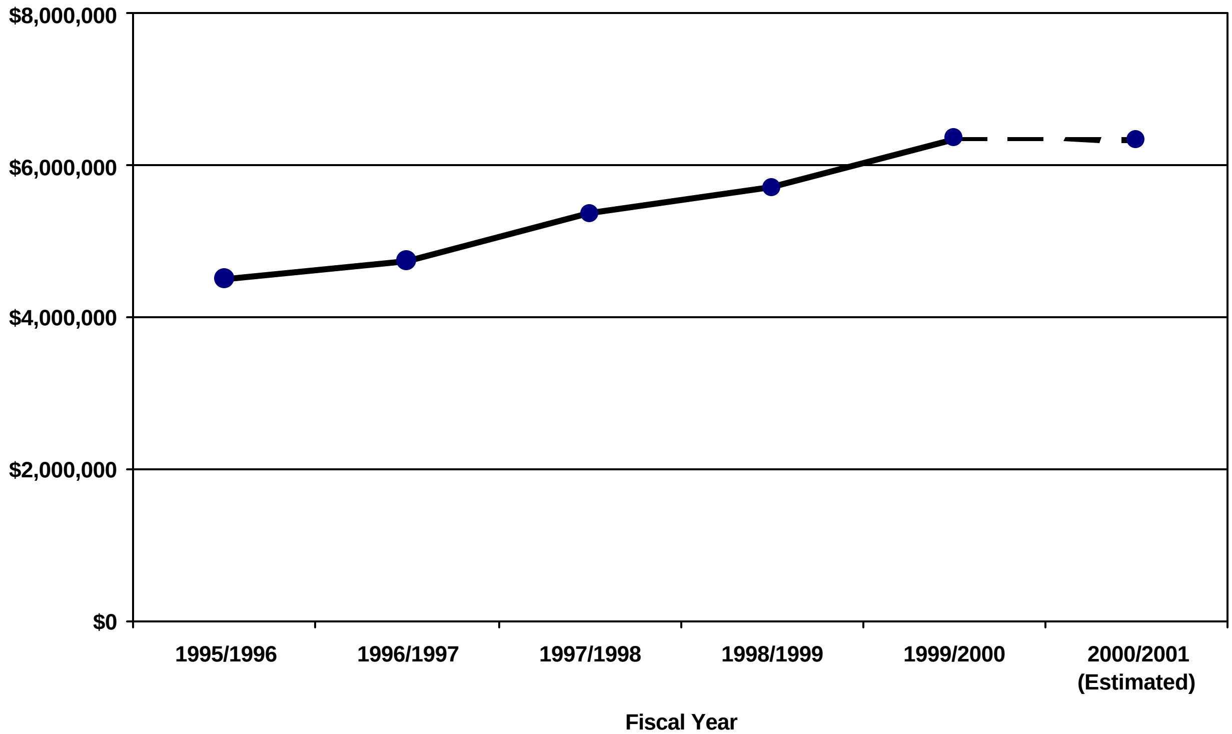
Figure 1-8 FAX Operating Costs FY 1996 to FY 2001



Farebox Revenue

Farebox revenue increased from FY 1996 to FY 2001 at levels comparable to the increases in ridership. Farebox revenue was $4.5 million in FY 1996 and is expected to reach over $6.3 million in FY 2001. The farebox ratio has remained very healthy, fluctuating around 30% throughout this period.

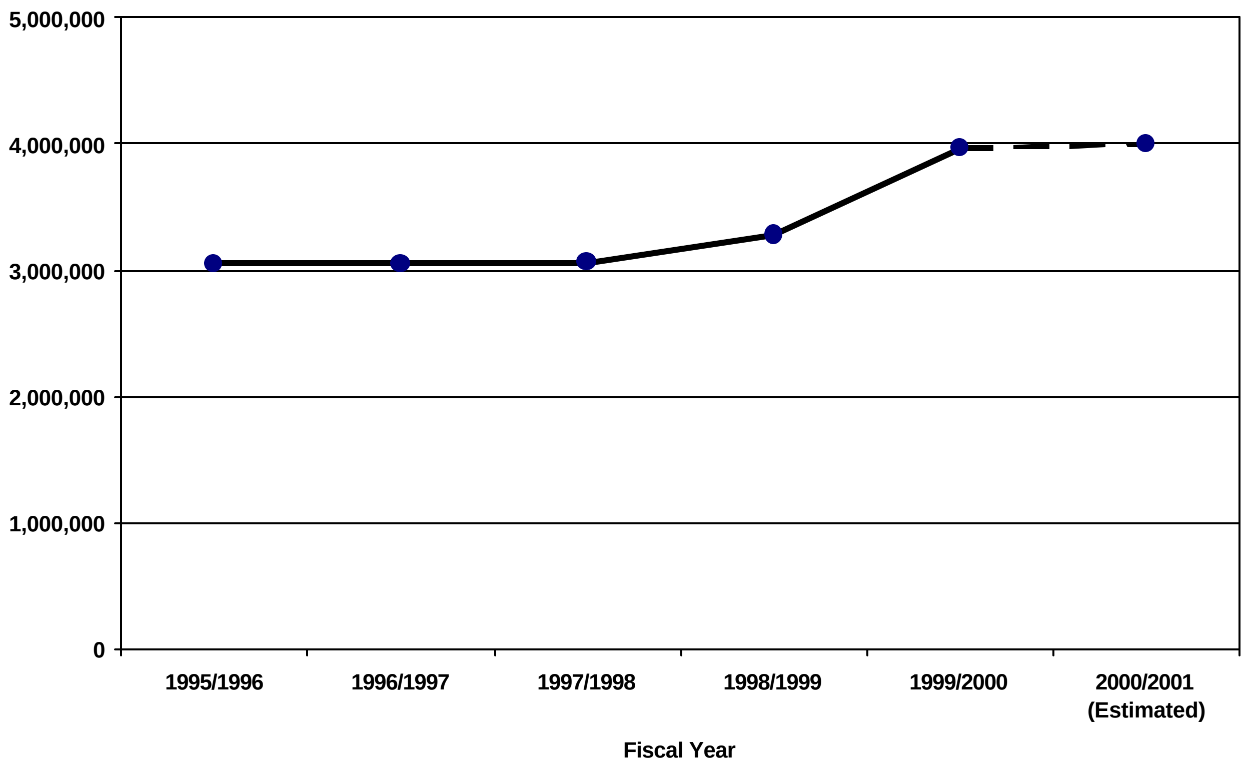
Figure 1-9 FAX Farebox Revenue FY 1996 to FY 2001



Revenue Miles

Revenue miles stayed fairly constant from FY 1996 to FY 1998, at just over 3 million. Service changes in 1999 increased the revenue miles to almost 3.3 million. Major additions of weekend and evening service in FY 2000 led to an increase of over 600,000 revenue miles, bringing the total for the year close to 4 million. Revenue miles for FY 2001 are expected to remain around the 4 million mark.

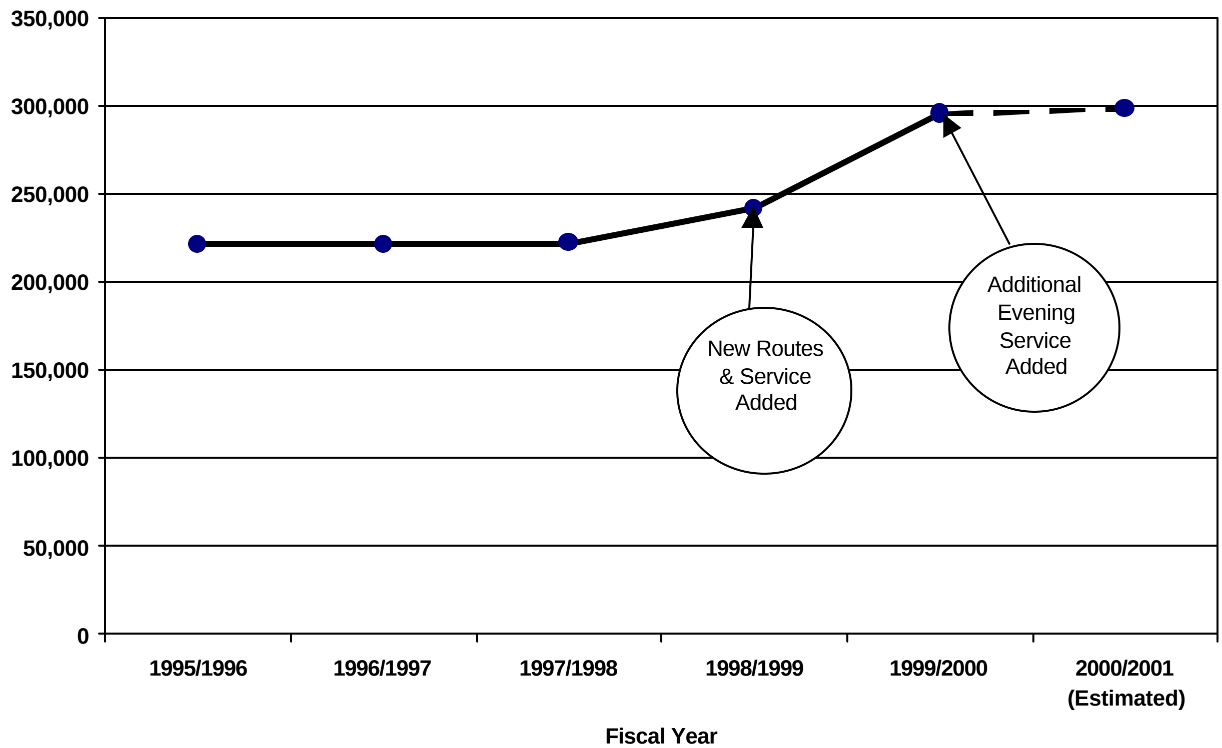
Figure 1-10 FAX Revenue Miles FY 1996 to FY 2001



Revenue Hours

Revenue hours stayed around 220,000 from FY 1996 to FY 1998. Service changes in FY 1999 and FY 2000 increased revenue hours to 240,000 in FY 1999 and then to nearly 300,000 in FY 2000. Revenue hours are expected to reach close to 300,000 again in FY 2001.

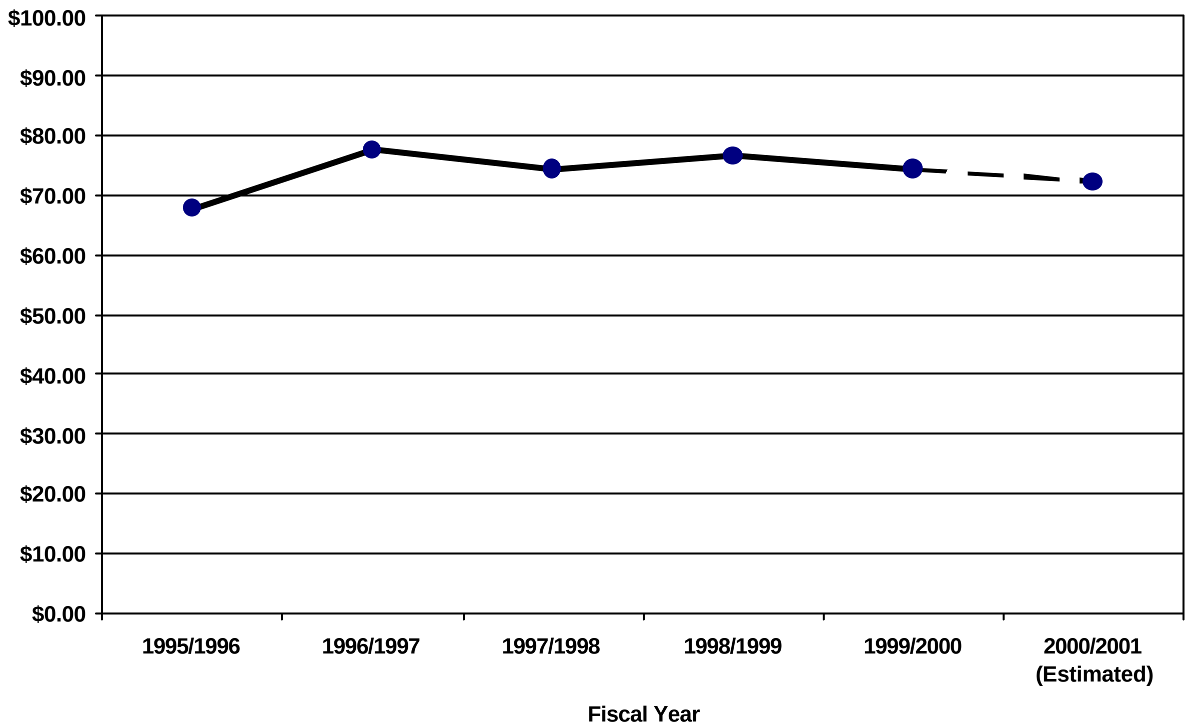
Figure 1-11 FAX Revenue Hours FY 1996 to FY 2001



Cost per Revenue Hour

Cost per revenue hour for FAX fixed route increased from $67.72 in FY 1996 to $74.37 in FY 2000. The cost is expected to decrease to $72.27 per revenue hour in FY 2001. The last few years have seen a decrease in cost per revenue hour from its high of $77.52 in FY 1997. With the exception of the jump in operating cost in FY 1997, increases in operating cost have been similar in scale to increases in revenue hours. This has led to a fairly constant cost per revenue hour from one fiscal year to the next.

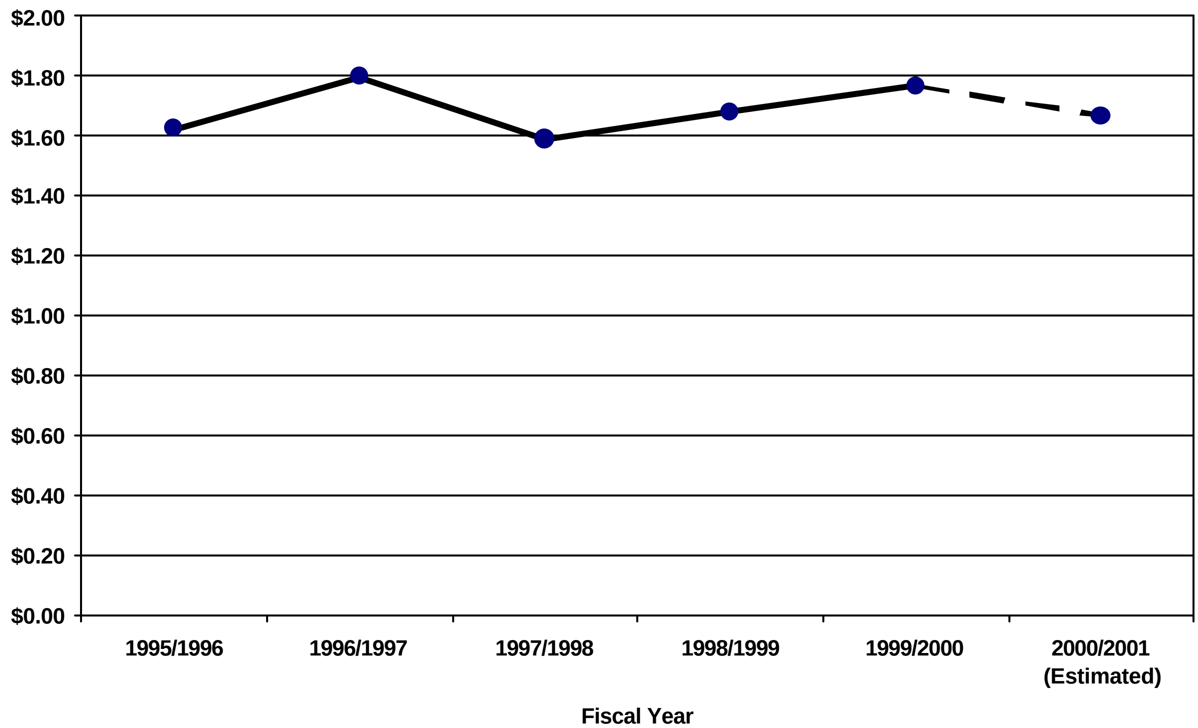
Figure 1-12 FAX Cost per Revenue Hour FY 1996 to FY 2001



Cost per Passenger

Cost per passenger fluctuated from FY 1996 to FY 2001. This cost reached a high of $1.80 in FY 1997 and in the very next year reached a low of $1.59. This occurred due to an increase in ridership combined with a decrease in operating costs. The estimated cost per passenger for FY 2001 is $1.67. In general, while ridership has increased steadily over the last five years, operating costs have generally increased in conjunction with service increases.

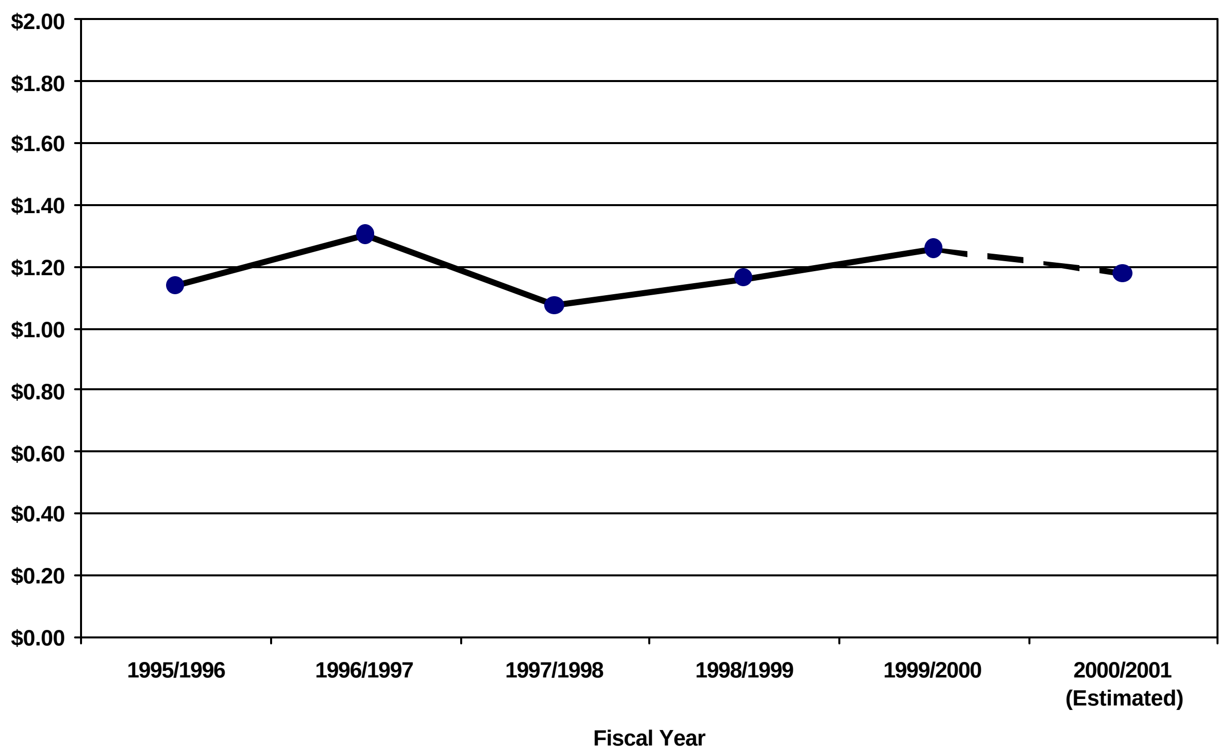
Figure 1-13 FAX Cost per Passenger FY 1996 to FY 2001



Subsidy per Passenger

The subsidy per passenger graph is very similar the graph for the cost per passenger. The subsidy reached a high of $1.30 in FY 1997 and a low of $1.07 in FY 1998. The estimated subsidy per passenger in FY 2001 is $1.18. Because the average fare per passenger has stayed around $0.50 from FY 1996 to FY 2001, the subsidy per passenger has fluctuated with cost per passenger.

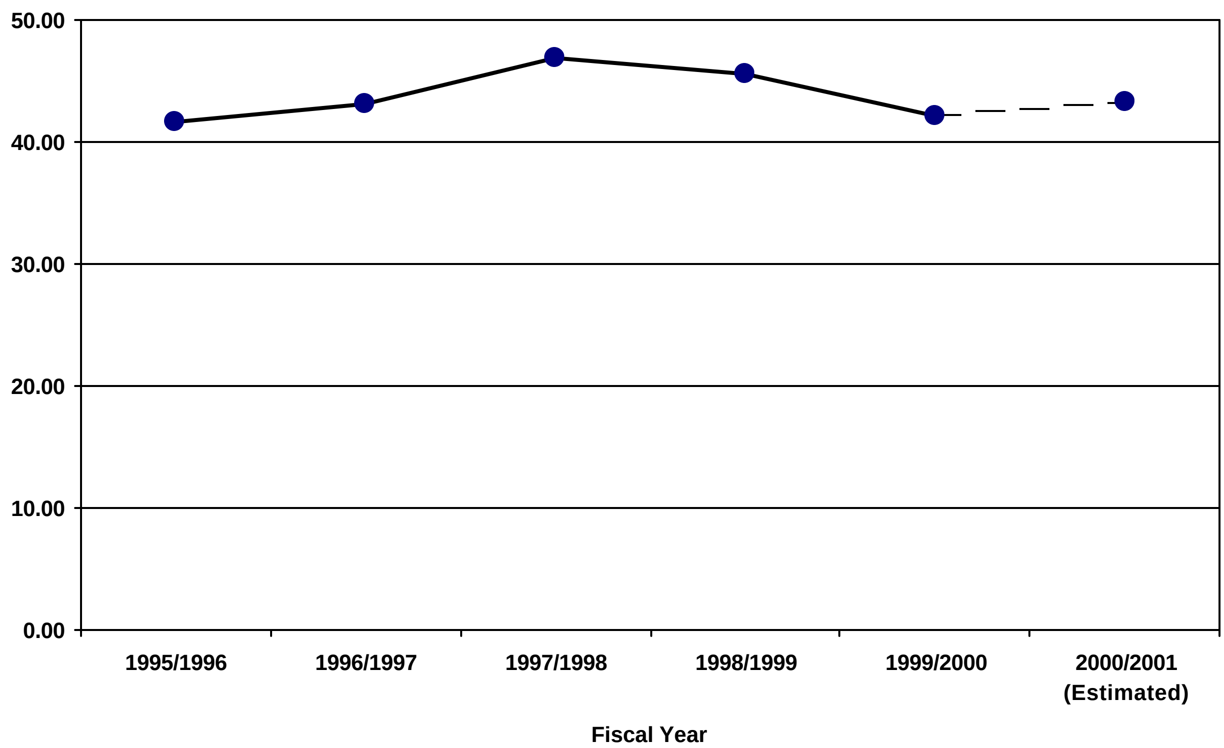
Figure 1-14 FAX Subsidy per Passenger FY 1996 to FY 2001



Passengers per Revenue Hour

From FY 1996 to FY 2001 FAX maintained an impressive systemwide average of over 40 passenger boardings per revenue hour. In FY 1996 FAX average 41.67 passengers per hour. This number peaked in FY 1998 at 46.81. An average of 43.35 passengers per hour is expected for FY 2001. Even for a heavily populated city such as Fresno, systemwide productivity over 40 passengers per revenue hours is excellent. High productivity does come with drawbacks, however, usually in the form of busy routes and standing passenger loads during peak travel hours.

Figure 1-15 FAX Passengers per Revenue Hour FY 1996 to FY 2001



Handy Ride Paratransit Performance Trends

Figure 1-16 shows the combined operating statistics and performance indicators for Handy Ride's paratransit system during the current (2001) and past five fiscal years (FY 1996/2000).

Figure 1-16 Handy Ride Operating Data and Performance Indicators

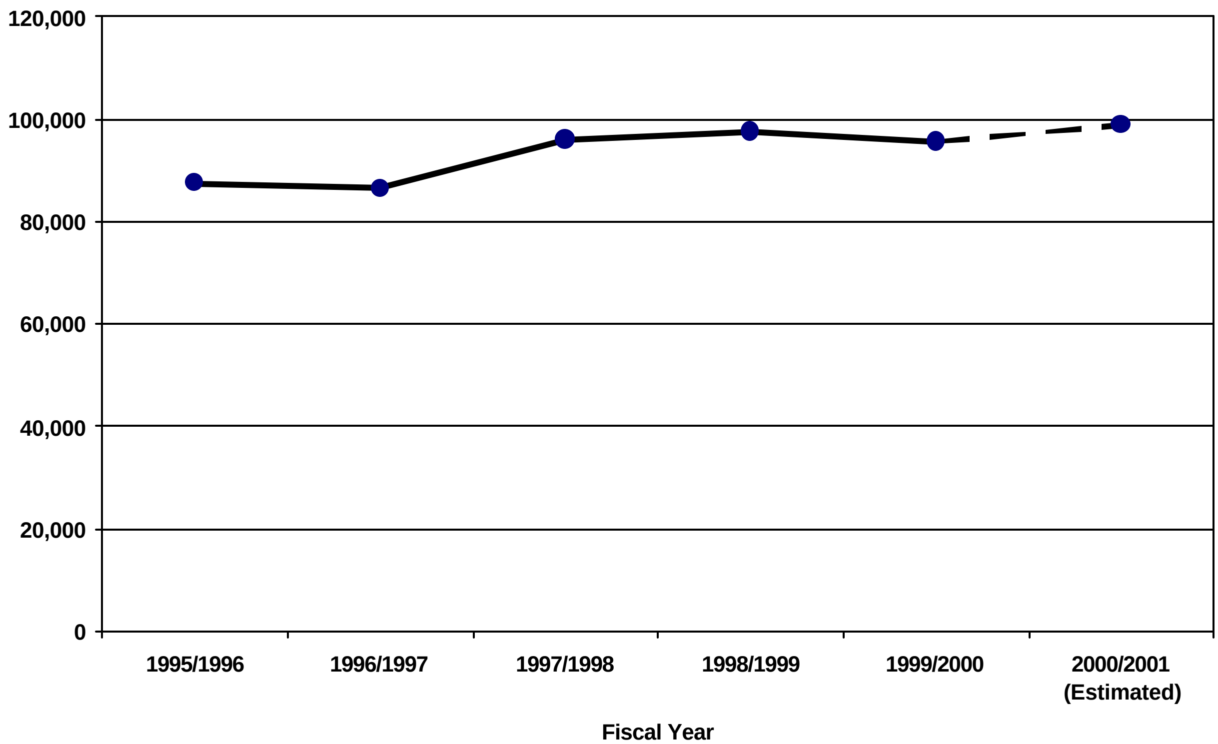
	1995/1996	1996/1997	% Change (95/96-96/97)	1997/1998	% Change (96/97-97/98)	1998/1999	% Change (97/98-98/99)	1999/2000	% Change (98/99-99/00)	2000/2001 (Estimated)
Operating Data										
Operating Cost	$1,087,035	$1,367,565	25.8%	$1,599,456	17.0%	$1,648,631	3.1%	$1,875,997	13.8%	$1,928,552
Passenger Boardings	87,466	86,504	-1.1%	96,026	11.0%	97,566	1.6%	95,603	-2.0%	98,918
Revenue Miles	525,480	402,443	-23.4%	635,611	57.9%	607,971	-4.3%	672,000	10.5%	722,304
Revenue Hours	36,665	36,336	-0.9%	39,552	8.9%	41,106	3.9%	44,848	9.1%	47,504
Farebox Revenue	$41,517	$45,073	8.6%	$45,361	0.6%	$59,177	30.5%	$62,463	5.6%	$64,297
Performance Indicators										
Cost/Passenger	$12.43	$15.81	27.2%	$16.66	5.4%	$16.90	1.4%	$19.62	16.1%	$19.50
Cost/Mile	$2.07	$3.40	64.3%	$2.52	-25.9%	$2.71	7.8%	$2.79	2.9%	$2.67
Cost/Hour	$29.65	$37.64	26.9%	$40.44	7.4%	$40.11	-0.8%	$41.83	4.3%	$40.60
Passengers/Mile	0.17	0.21	29.1%	0.15	-29.7%	0.16	6.2%	0.14	-11.3%	0.14
Passengers/Hour	2.39	2.38	-0.2%	2.43	2.0%	2.37	-2.2%	2.13	-10.2%	2.08
Farebox Ratio	3.8%	3.3%	-13.7%	2.8%	-14.0%	3.6%	26.6%	3.3%	-7.2%	3.3%
Average Fare/Passenger	$0.47	$0.52	9.8%	$0.47	-9.3%	$0.61	28.4%	$0.65	7.7%	$0.65
Subsidy/Passenger	$11.95	$15.29	27.9%	$16.18	5.9%	$16.29	0.7%	$18.97	16.4%	$18.85

Source(s):
Transit Productivity Evaluation FY 1999-2000
Triennial Performance Audit of Fresno Area Express and Handy Ride for Fiscal Years 1994/1995 to 1996/1997
Handy Ride Statistical Summary for 6/2000 to 12/2000 from Laidlaw
Note(s):
YTD FY 2001 Includes data from July 2000 to December 2000
Operating costs for FY 2000/2001 were derived based on the average cost/mile for Handy Ride service during the previous five years ($2.67)
Farebox revenues for FY 2000/2001 were estimated based on an average fare per passenger of $0.65

Passenger Boardings

Handy Ride ridership increased from 87,466 in FY 1996 to nearly 100,000 in FY 2001, although ridership fluctuated somewhat during this period. The largest increase occurred from FY 1997 to FY 1998 when passenger boardings went up by almost 10,000. This ridership increase corresponded with a significant increase in service (revenue hours and miles).

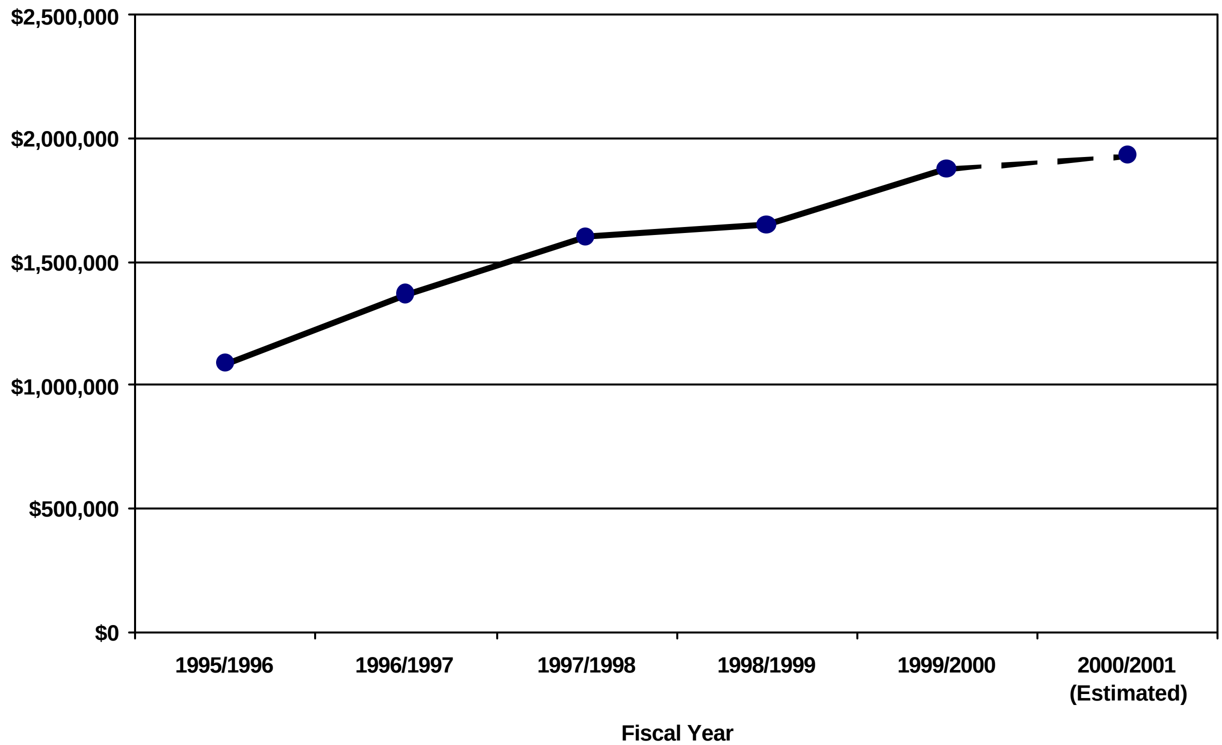
Figure 1-17 Handy Ride Passenger Boardings FY 1996 to FY 2001



Operating Cost

In FY 1996 Handy Ride's operating costs were just over $1 million. Estimated operating costs for FY 2001 are almost $1.9 million, an increase of over 70%. The most significant increase occurred from FY 1996 to FY 1997 when operating costs increased by almost $300,000. In recent years costs have increased at a much slower rate.

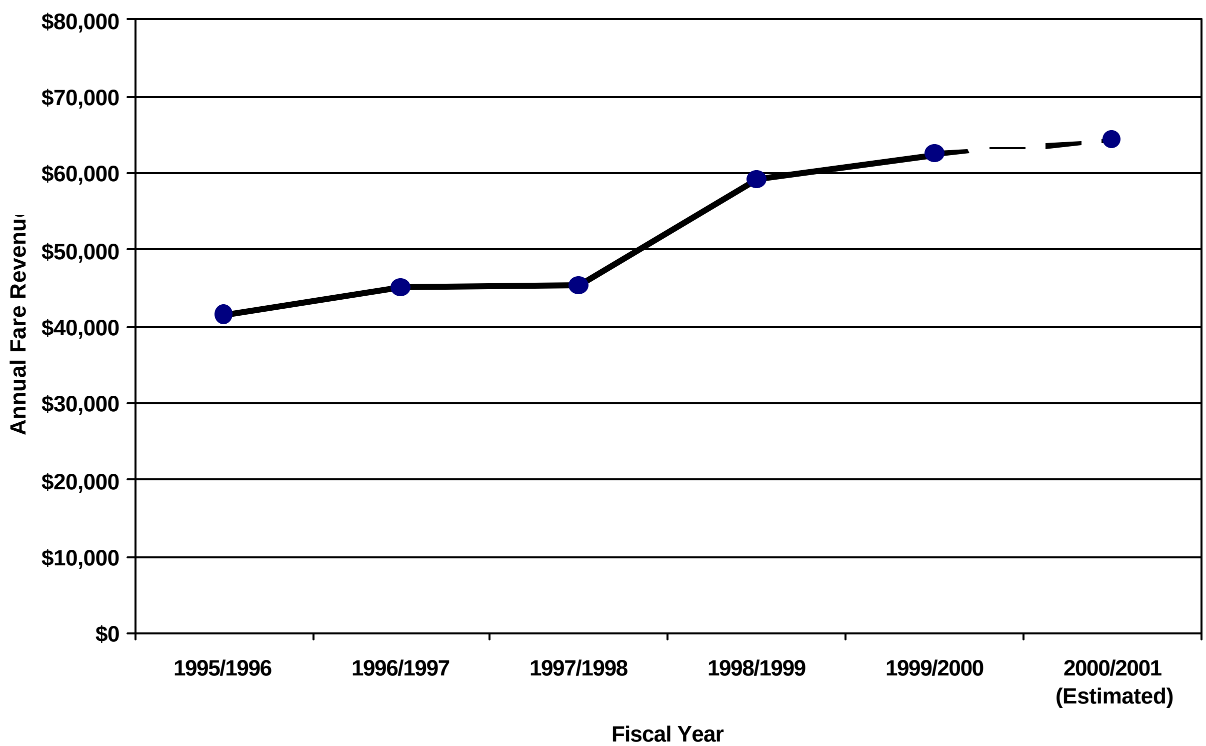
Figure 1-18 Handy Ride Operating Costs FY 1996 to FY 2001



Farebox Revenue

Handy Ride Farebox Revenues have increased consistently with ridership over the past five years, from a low of $41,000 in FY 1996 to an estimated high of $64,000 in FY 2001. The largest increase in farebox revenue occurred from FY 1998 to FY 1999, following increases in ridership in both those years.

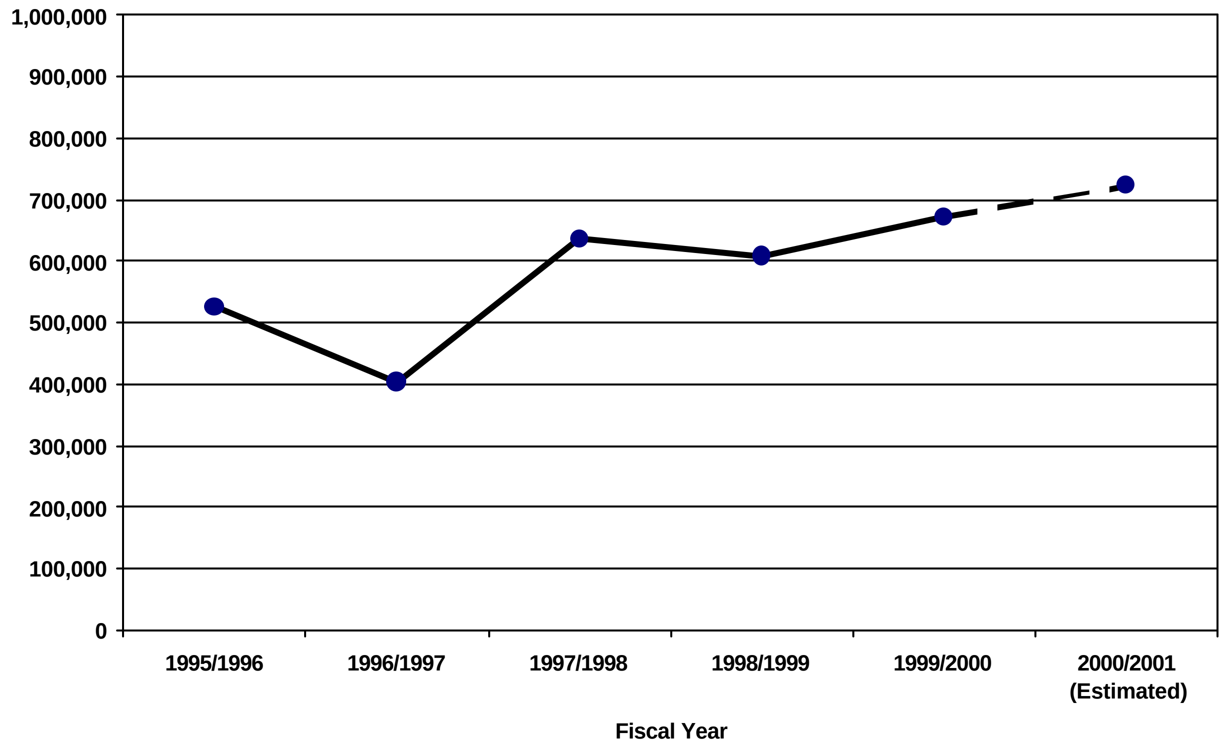
Figure 1-19 Handy Ride Farebox Revenue FY 1996 to FY 2001



Revenue Miles

Handy Ride revenue miles increased overall from FY 1996 to FY 2001 from 525,480 to an expected high of over 700,000. Revenue miles fluctuated during the period, however, including a dramatic drop from FY 1996 to FY 1997, an even larger increase from FY 1997 to 1998, and a slight decrease the following year.

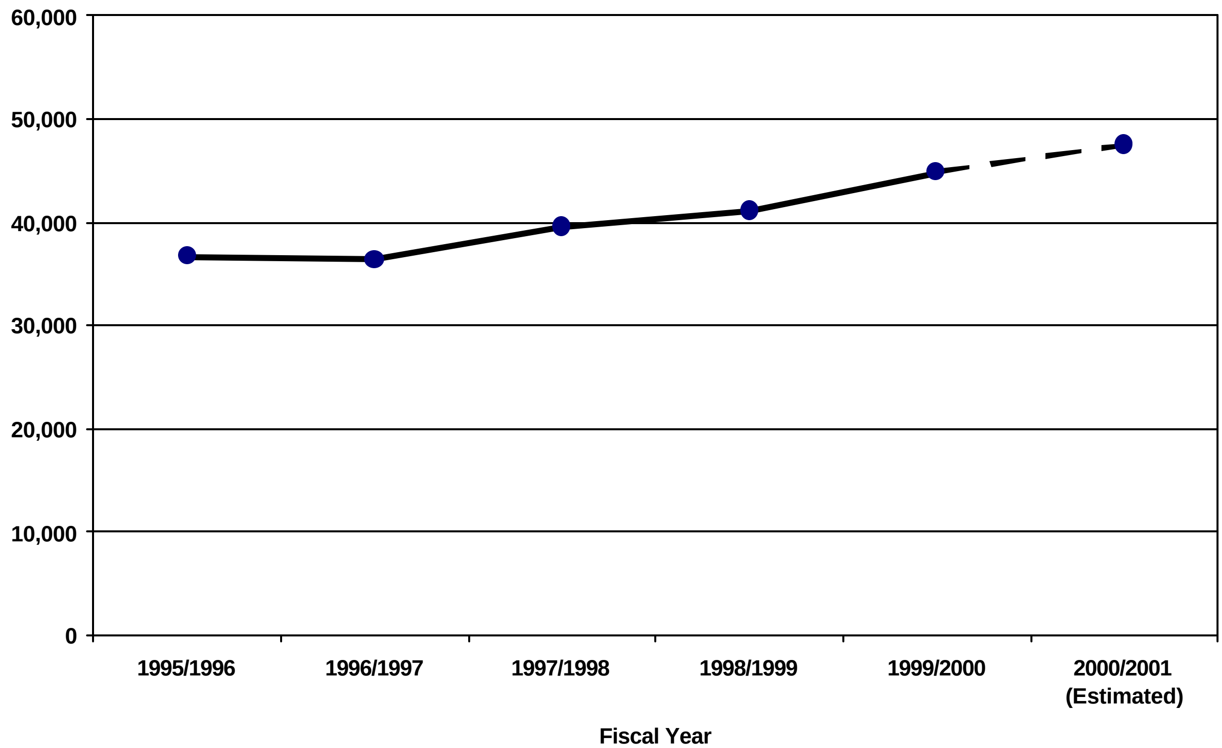
Figure 1-20 Handy Ride Revenue Miles FY 1996 to FY 2001



Revenue Hours

Except for a slight decrease in FY 1997, Handy Ride revenue hours increased steadily from 36,665 in FY 1996 to an estimated 47,504 in FY 2001.

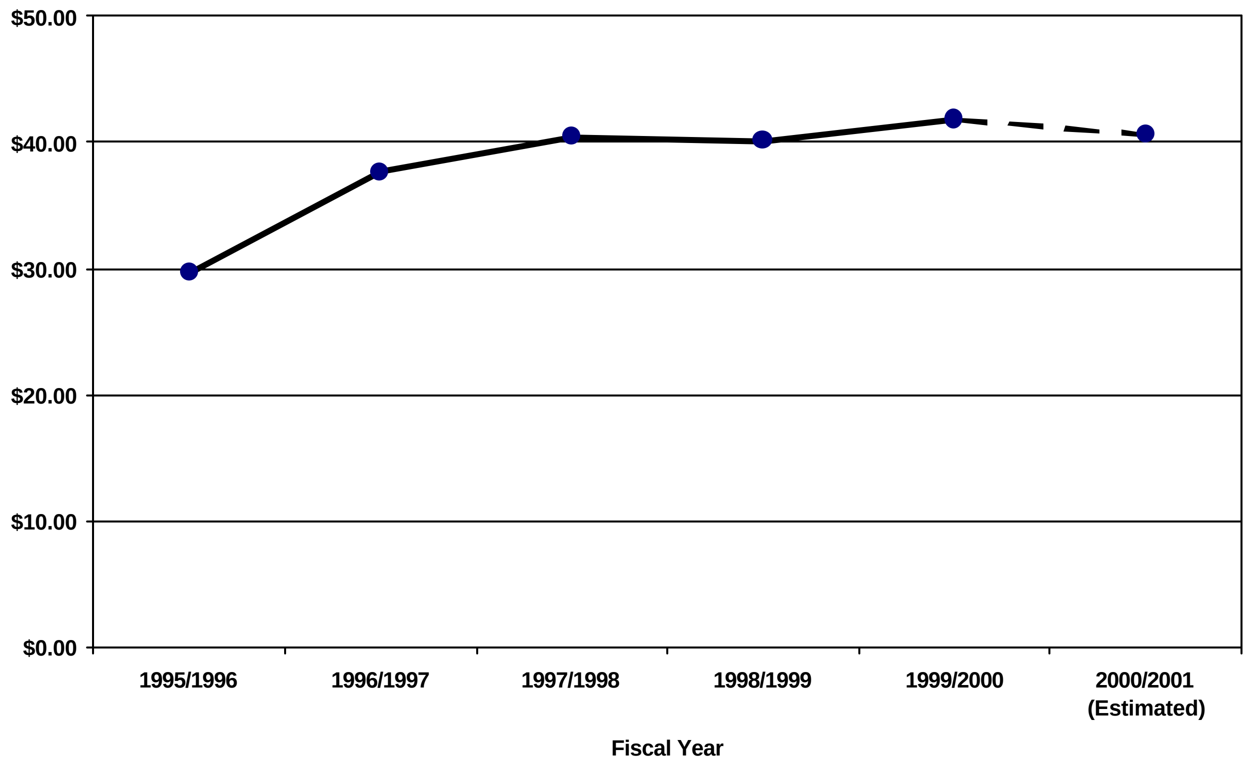
Figure 1-21 Handy Ride Revenue Hours FY 1996 to FY 2001



Cost per Revenue Hour

Cost per revenue hour for Handy Ride services increased dramatically from $29.65 in FY 1996 to $37.64 in FY 1997. Since then the cost has risen slowly to $41.83 in FY 2000. In FY 2001 the Handy Ride cost per revenue hour is expected to drop slightly to $40.60. With the exception of the jump in operating cost combined with a drop in revenue hours in FY 1997, increases in operating cost have been similar in scale to increases in revenue hours. This has led to a fairly constant cost of around $40 per revenue hour since FY 1997.

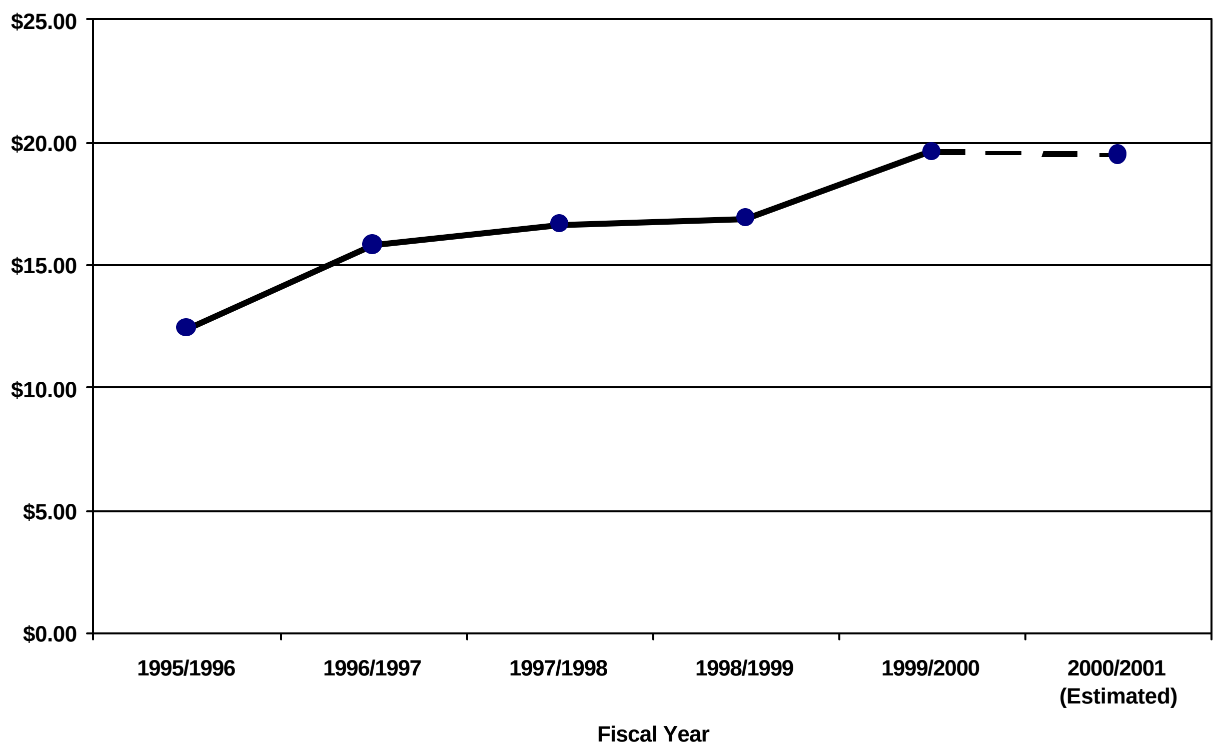
Figure 1-22 Handy Ride Cost per Revenue Hour FY 1996 to FY 2001



Cost per Passenger

Handy Ride's cost per passenger has risen steadily from FY 1996 to FY 2000. The cost started at a low of $12.43 in FY 1996 and reached $19.62 in FY 2000. So far in FY 2001 the cost per passenger is below $19. Generally, while costs have been rising in recent years, Handy Ride ridership has been increasing slowly or even decreasing. FY 2001 may see a turnaround as ridership has been increasing at a higher rate than costs.

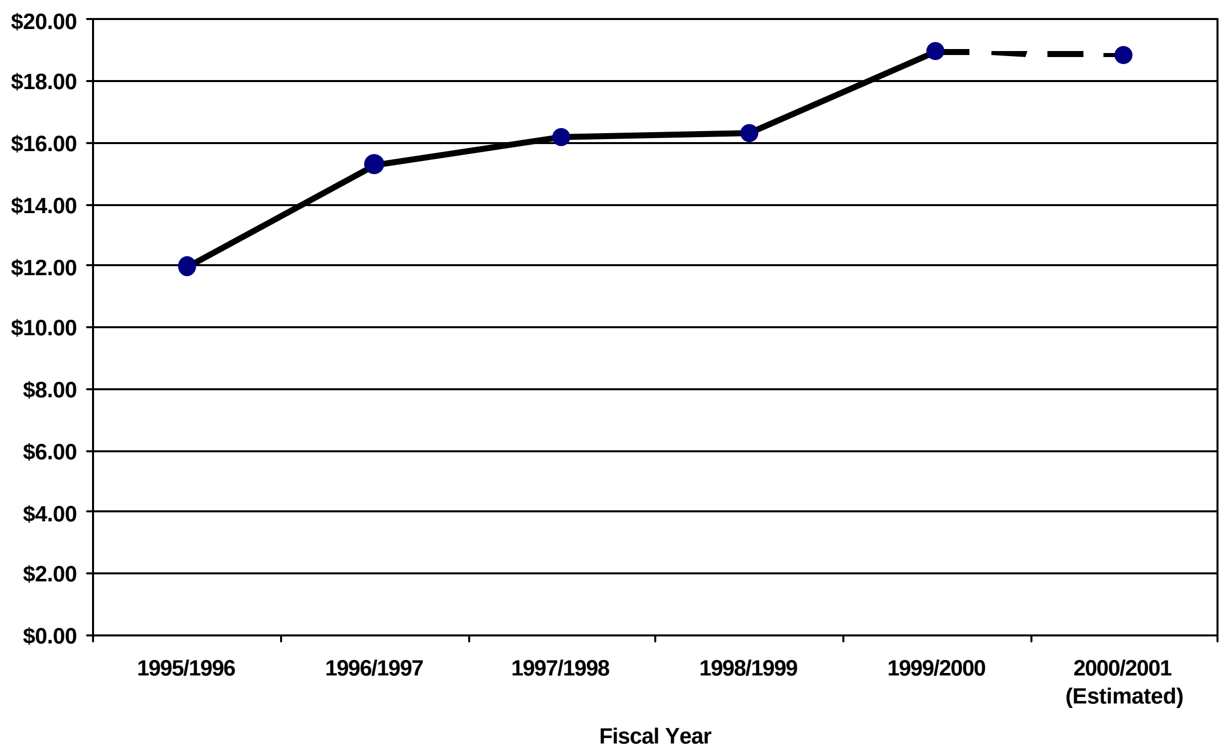
Figure 1-23 Handy Ride Cost per Passenger FY 1996 to FY 2001



Subsidy per Passenger

Despite increases in the average fare per passenger, Handy Ride subsidy per passenger has been increasing over the past five years. From a low of $11.95 in FY 1996, the subsidy per passenger has risen to an estimated high of $18.85 in FY 2001. The most significant jumps occurred from FY 1996 to 1997 and FY 1999 to FY 2000. These increases matched significant increases in operating costs during the same periods.

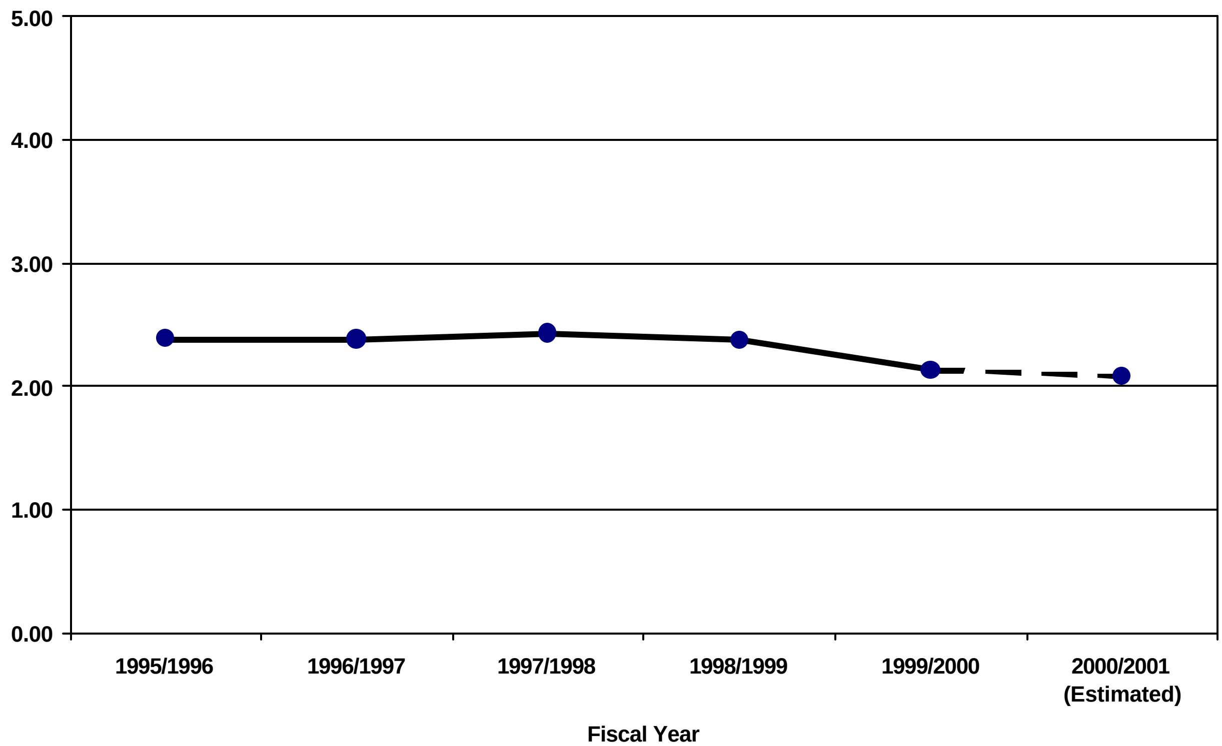
Figure 1-24 Handy Ride Subsidy per Passenger FY 1996 to FY 2001



Passengers per Revenue Hour

From FY 1996 to FY 1999 Handy Ride maintained an average of around 2.4 passengers per revenue hour. In FY 2000 the average decreased to 2.13 passengers per hour. This number is estimated to drop to 2.08 passengers per revenue hour in FY 2001. In recent years, the annual number of passengers has been fluctuating while revenue hours have increased.

Figure 1-25 Handy Ride Passengers per Revenue Hour FY 1996 to FY 2001



Overview of Route-by-Route Boardings and Productivity

This final section examines route-by-route ridership and productivity, and provides a comparison of FAX routes based on these statistics. A complete overview of each route is provided in Appendix B. This includes route statistics, a route description, boarding activity analysis, general comments and observations, and a map of average daily boardings by stop overlaid on 1999 combined population and employment density for each route.

FAX staff collects ridership data through ridechecks by planning staff and from data produced by GFI fareboxes. This data is used to calculate annual boardings and productivity for FAX fixed routes. The data show high annual ridership for several FAX routes. Routes 26 and 28 had over 1.5 million annual boardings in both FY 2000 and are estimated to repeat this in FY 2001. Routes 30 and 38 are approaching the 1.5 million mark. A total of eight routes are expected to reach over 1 million boardings in FY 2001.

Productivity numbers for FAX fixed routes are excellent. Average productivity for the system has been over 40 passengers per revenue hour for several years. In FY 2000, FAX had nine routes with productivity over 40 passengers per revenue hour. FAX route 28 has maintained an average of over 50 passengers per revenue hour for the first half of FY 2001.

Figures 1-26 and 1-27 below show annual boardings for FAX fixed routes in FY 2000 and 2001, respectively. Annual boardings for FY 2001 are estimates based on actual boardings from July to December of 2000. Figures 1-28 and 1-29 show productivity for the same periods. Individual route descriptions are included in Appendix B.

Figure 1-26 FAX Passenger Boardings by Route FY 1999/2000

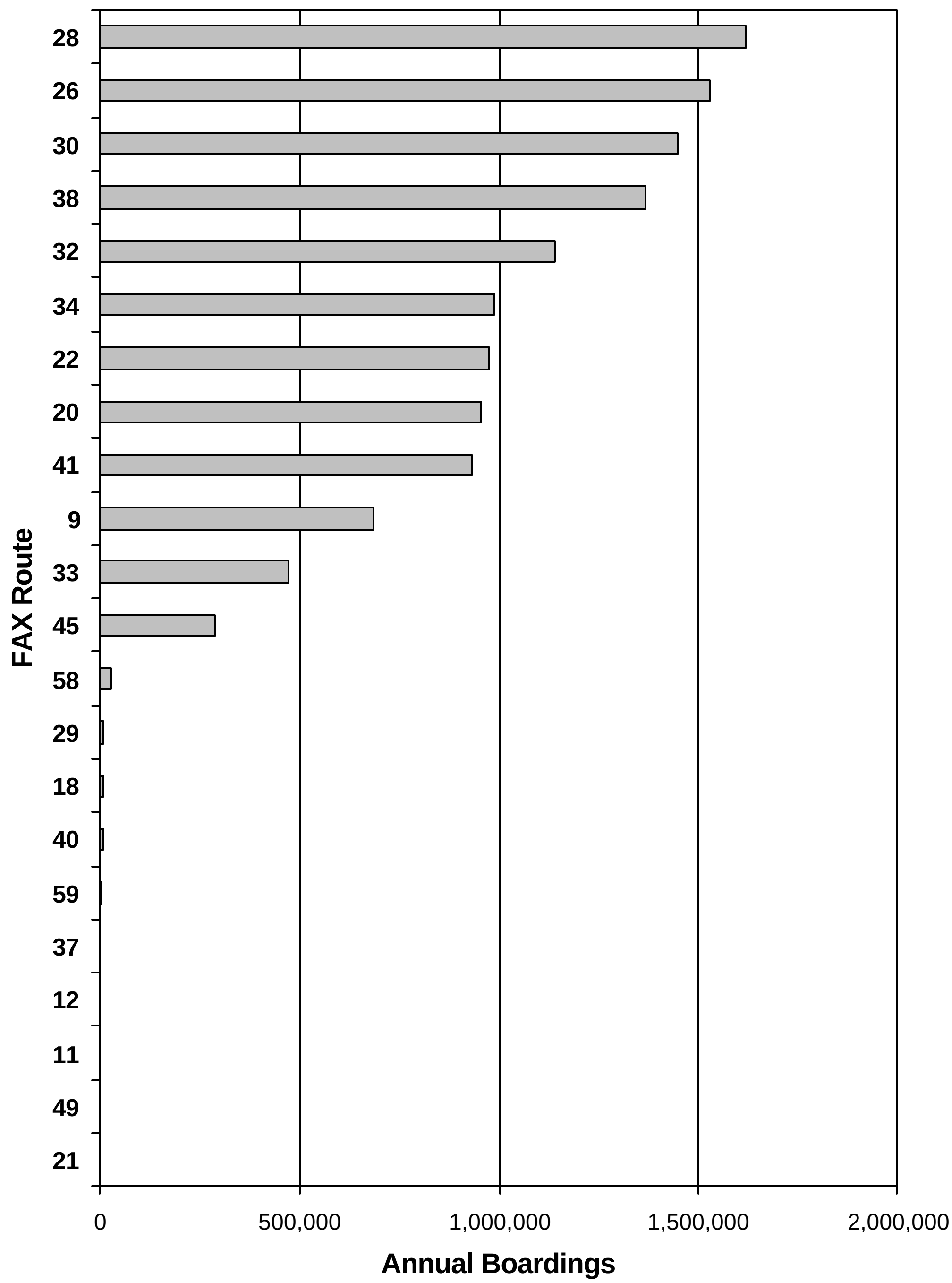


Figure 1-27 FAX Passenger Boardings by Route FY 2000/2001

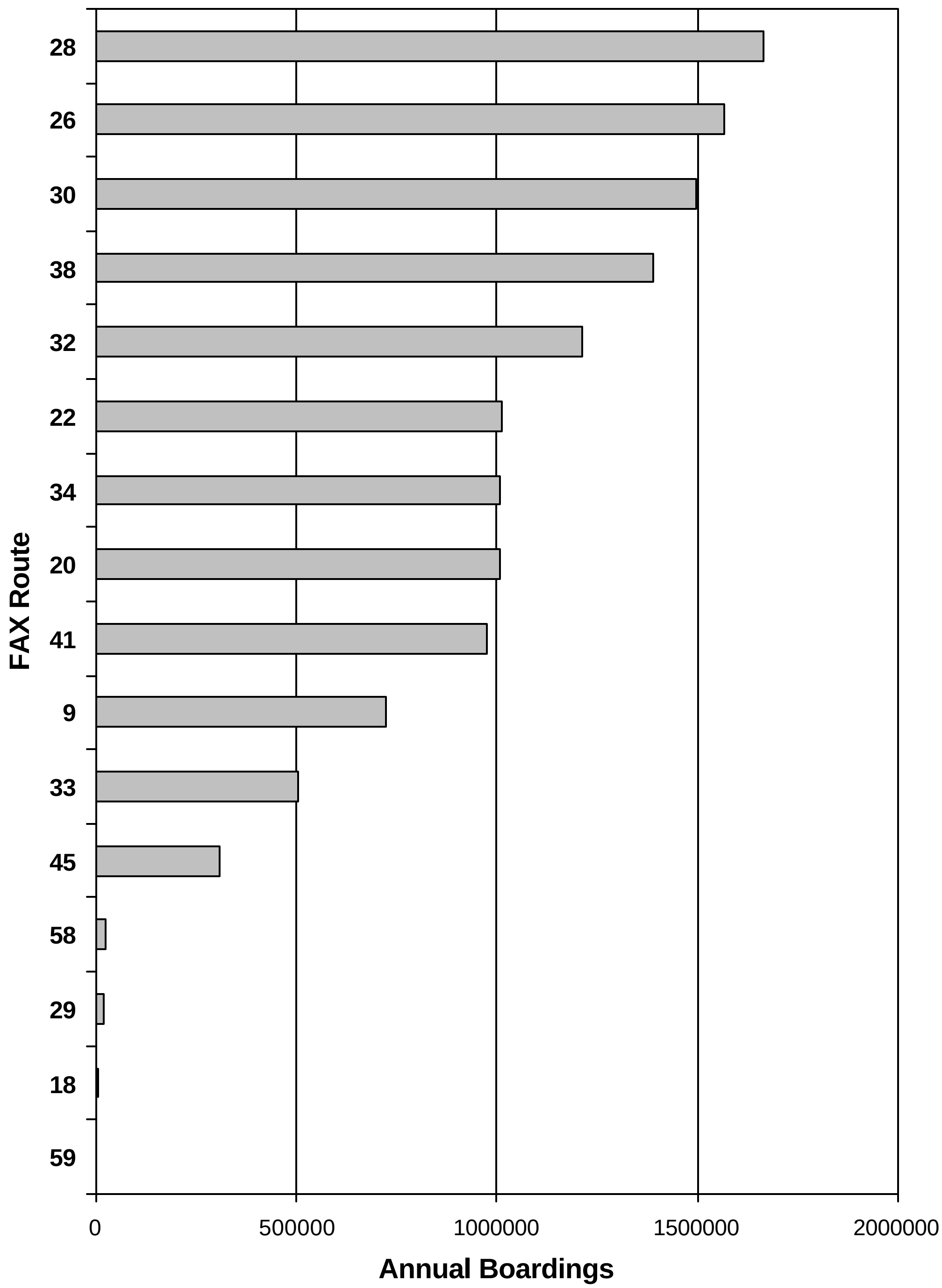


Figure 1-28 FAX Productivity by Route FY 1999/2000

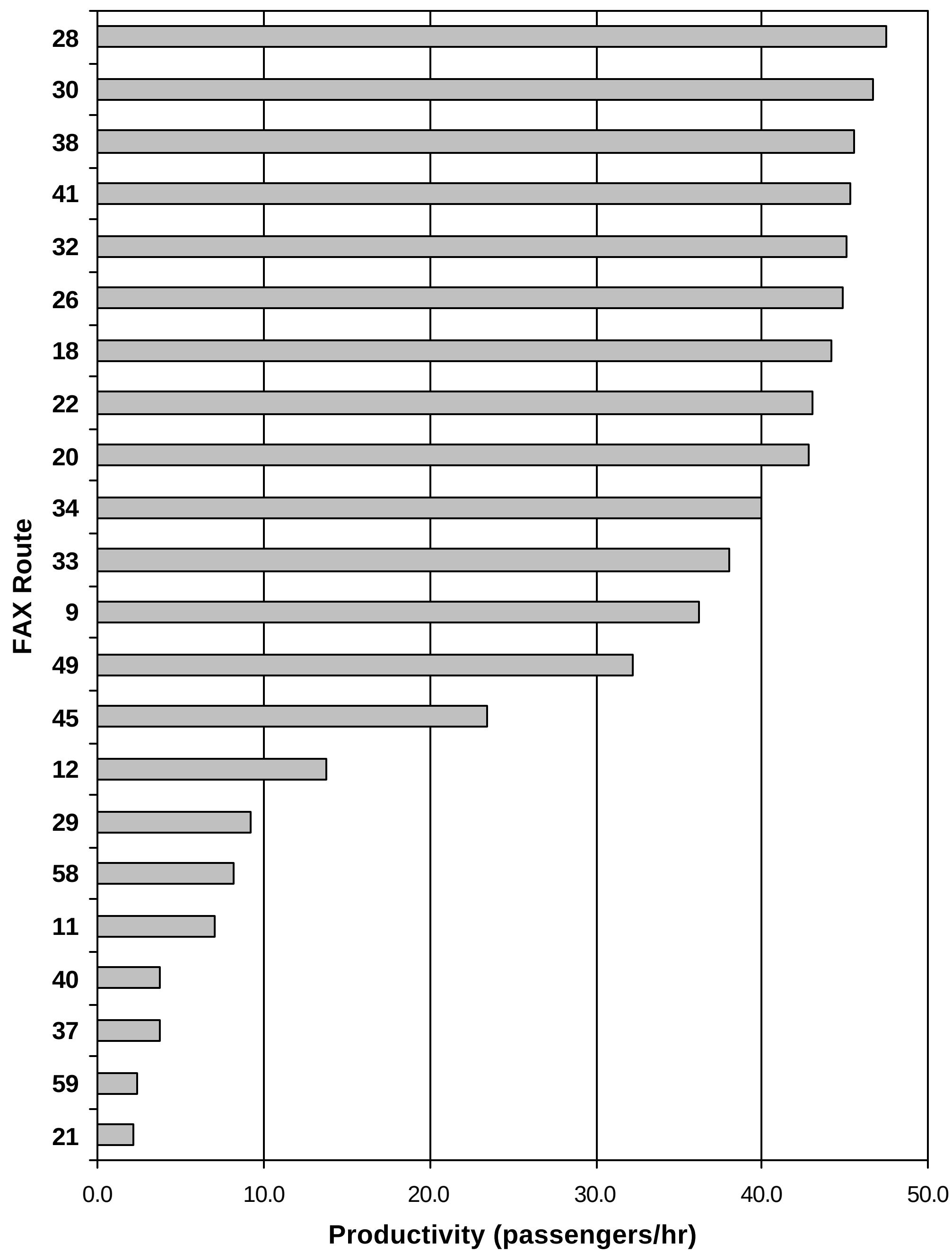
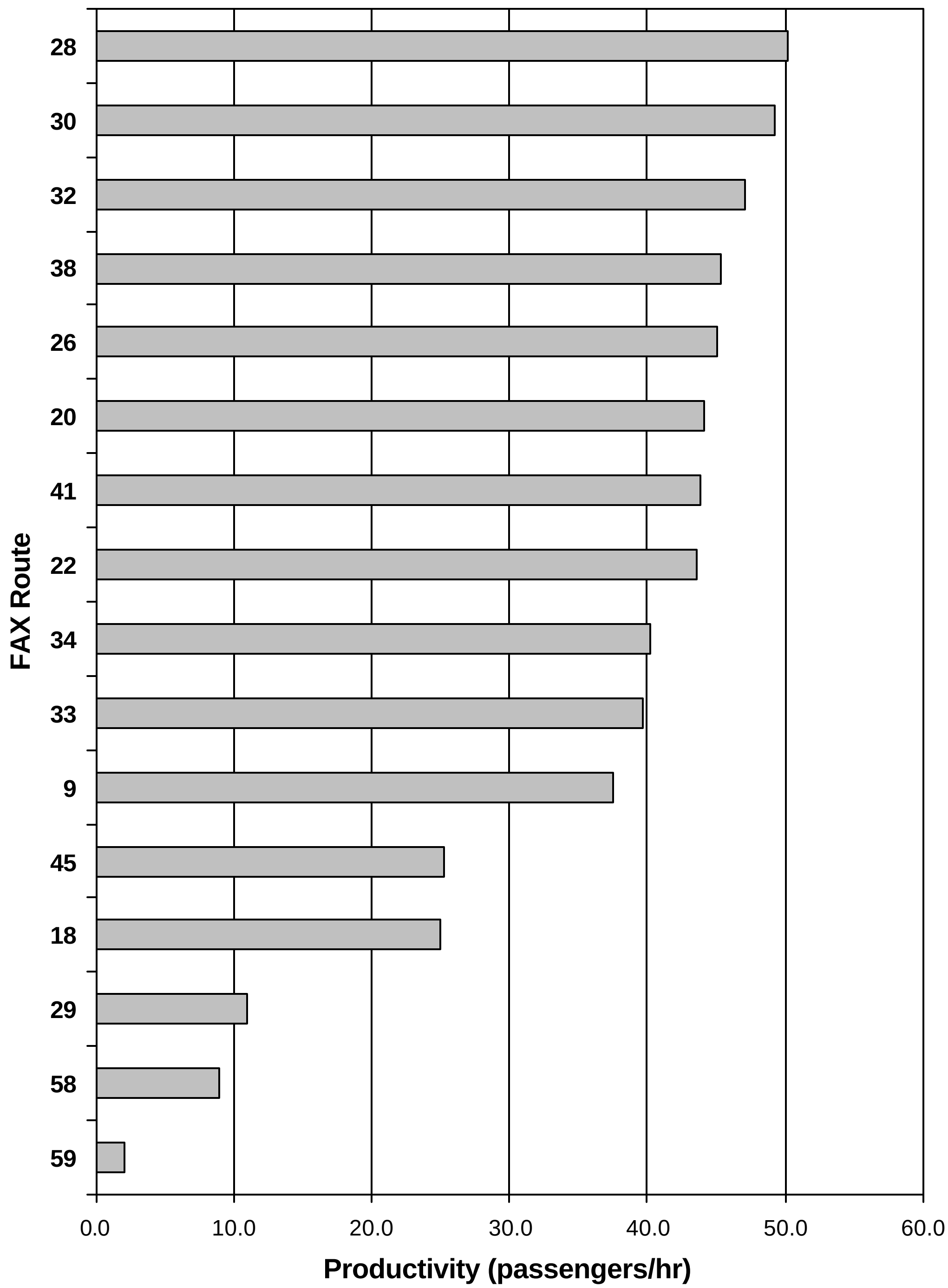


Figure 1-29 FAX Productivity by Route FY 2000/2001



Chapter 2. Population and Employment Densities

Exploring the Linkage Between Density and Transit Use

In most metropolitan areas, population and employment density are the factors which tend to have the greatest influence on transit demand[1]. The density of residential, retail and commercial development determines the number of people and/or activities that are in close proximity to transit services. Furthermore, as the density of development increases, so do the incentives that people might have for using transit. For example, as density increases, so does traffic congestion, parking fees, parking congestion, etc. Regardless of income or age, sheer density more often than not determines the size of the market for which transit is competing, and tends, as a result, to be the strongest indicator of transit potential. Of course there are other important indicators affecting transit use such as the proximity of a large university or employment center that attracts or generates a particularly heavy demand for transit.

The Council of Fresno County Governments (COFCG) regularly prepares estimates of employment and residential population for each of the nearly 500 Traffic Analysis Zones (TAZ) in the metropolitan area. N\N has taken these estimates for each TAZ and combined them into a single "unit" of measurement called population-employment density (pop-emp). Five categories of density have been created for Fresno: Very High, High, Medium, Low and Very Low. Each category is assigned a specific color and then each TAZ is color-coded according to its corresponding density. The categories and their corresponding values are shown in Figure 2-1.

[1] Demographic data, such as household income or auto ownership, are often used to determine potential transit use. N\N has found that these factors may be useful in rural areas, but they tend to be unreliable in suburban and urban areas.

Figure 2-1 Residential and Employment Density Categories

	Range 1				Range 2		
Category	Residential *# of people*		Employment *# of people*		Residential *# of people*		Employment *# of people*
Very High Density	> 4,000	and	> 6,000	or	> 7,500	and	> 3,000
High Density	0 - 4,000	and	> 6,000	or	> 7,500	and	0 - 3,000
Medium Density	0 - 7,500	and	3,000 - 6,000	or	4,000 - 7,500	and	0 - 6,000
Low Density	0 - 4,000	and	1,000 - 3,000	or	1,000 - 4,000	and	0 - 3,000
Very Low Density	0 - 1,000	and	0 - 1,000				

YEAR 1999

Very High Density

Figure 2-2 presents the current (Year 1999) population-employment density for each TAZ in the study area[2]. The areas with Very High Density (high levels of both residential and employment) are depicted by the dark green color. These include:

- Downtown Fresno
- Central Fresno (between Clinton/Millbrook/Dakota/Fresno)
- North Central Fresno (between Gettysburg/Cedar/Barstow/Hwy 41)
- Southwest Fresno (between Belmont/Orange/Butler/Maple)
- Clovis (south of Shaw, between Willow/Minnewawa)

These might logically be considered the areas with the greatest potential for generating strong and consistent (i.e., all-day) transit demand. Typically, these warrant the highest level of service possible; usually 15-minute headways or better for all day service. The reason for this is that they have the greatest mix of uses which in turn leads to strong demand for frequent, all-day services.

High Density

On the next level are those areas which have either high residential density or high employment density. This tilting towards one type of development or the other typically

[2] For the moment, disregard the orange zones on this map. The orange zones are used later as a comparison for areas of high growth as noted on the 2020 map (Figure 2-3).

means that demand will be stronger for commute-oriented services than it will be for all-day services. Typically these zones warrant peak period services of 15 minutes or better, and off-peak services of 30 minutes or better. This category called High Density is depicted on the map by the "avocado green" color. TAZs with this level of density can be found:

- East of Hwy 41 (between California/Herndon/Peach)
- West of the BNSF railroad tracks (between Hwy 99/Shields/Sierra)

Medium Density

The next level of development is called Medium Density. This category includes those TAZs that have medium density residential development and/or medium density employment. Medium density is shown as "sage green" on the map. Areas that generally fit this description include:

- Most of Clovis
- Central Fresno (in and around Clinton/Palm)
- North Central Fresno (between Hwy 41/Gettysburg/Herndon/Palm)
- Southwest Fresno (between Belmont/Willow/Fowler/Kings Canyon)

This level of density typically warrants peak period service every 30 minutes, with off-peak service every 60 minutes. Note - Some of these areas might, by default, receive more frequent service if they happened to be located between two areas with higher levels of density.

Low and Very Low Density

These last two categories, Low and Very Low Density, represent those areas where transit will typically have a very difficult time generating ridership. Some of these areas may have such limited ridership potential that they do not warrant traditional fixed route services. They may be better served by services such as Community Bus, Deviated Fixed Routes, DART (Direct Access Responsive Transit) or Dial-a-Ride.

Areas with these levels of density include:

- Northwest Fresno (between West/Hwy 99/Sierra/San Joaquin River)
- Southeast Fresno (South of Kings Canyon and East of Peach)
- West Fresno (numerous areas west of Hwy 99)

YEAR 2020

As development progresses over the next twenty years, where will the most noticeable changes occur (i.e., areas moving into High or Very High Density)?

Figure 2-3 shows the population-employment density for the Year 2020.

Southwest Fresno

- TAZs adjacent to Church and Martin Luther King

Southeast Fresno

- Kings Canyon between Willow and Fowler

East Fresno

- TAZs immediately south and east of the airport

North Central Fresno

- TAZs north of Herndon between Millbrook/Perron/Willow

West Fresno

- TAZs adjacent to Cornelia and Ashlan
- TAZs adjacent to Barstow and Valentine

Clovis

- Along Shaw (btwn Minnewawa and Clovis)
- North Clovis (btwn Fifth/Fowler/Hwy 168/Minnewawa)

These eight areas are shown with an orange boundary. For purposes of comparison, the same orange zones are shown on the Year 1999 map.

Individual maps of residential density for 1999 and 2020 and employment density for 1999 and 2020 are included in Appendix A. These maps can be useful for determining whether population or employment is providing a greater contribution to density levels in the aggregated population and employment density maps.

COMPARING SERVICE LEVELS AND DENSITY

Figure 2-4 provides a comparison between the current (1999) density of development and the level of transit service being provided. In theory there should be a correlation between density and service levels. In a sense, the higher the density the greater the level of service (this usually means frequency) an area should receive.

Looking at the map, one can see that there are a number of areas with Low or Medium density that receive the same level of service as areas with High or Very High density. For example:

- Most of West Fresno, west of Highway 99, is either Medium or Low Density, yet this area receives the same level of service (every 30 minutes) as First Street and Cedar Streets, two of the highest density corridors in the entire region.
- For another example we can compare South Fresno (between Church/Walnut/MLK/Elm) with Tulare Street (between downtown and Maple) and Ventura (between downtown and Peach). Both Tulare and Ventura have higher levels of density and development than South Fresno, yet both of these streets receive the same 30-minute service that's provided in South Fresno.
- The same is true of the Malaga area, south of Jensen. This area is primarily Medium and Low density, yet it receives the same level of service as Shaw Avenue.

Balancing service levels with density will be explored during the service planning phase of this project.

Figure 2-2 Year 1999: Combined Residential and Employment Densities

[Graphics File]

Figure 2-3 Year 2020: Combined Residential and Employment Densities

[Graphics File]

Figure 2-4 Year 1999: Comparison of Service Levels and Density

[Graphics file]

Chapter 3. Origin-Destination Travel Patterns

Chapter 3 provided an overview of one of the most important indicators of transit demand and use – the density levels of residential and employment development. Another factor which ultimately influences the design of transit services, especially for a long range plan, is origin-destination travel patterns. This chapter provides a glimpse of the predominant origin-destination patterns for the next 20 years.

METHODOLOGY

The Council of Fresno County Governments (COFCG) maintains the County's travel model. TJKM Transportation Consultants worked closely with COFCG staff to develop forecasts of travel patterns (**daily person** trips) for three specific planning periods: Year 2001 (current), Year 2010 and Year 2020.

The travel pattern information is calculated and analyzed at the Traffic Analysis Zone level (TAZ). There are over 500 TAZs in the County's travel model. A typical TAZ covers about .25 sq miles. Planning units this size are far too small and too detailed to be of significant value for a long range study. For that reason, Nelson\Nygaard undertook a process of aggregating the 500+ TAZs into 84 "Superzones." A typical Superzone includes six to ten TAZs. This macro approach to analyzing origin/destination data is much more useful for a long range project. A map depicting the TAZ aggregation is shown in Figure 3-1.

Once the TAZs were converted into Superzones, TJKM had COFCG execute model runs for Years 2001, 2010 and 2020. A matrix was created for each period illustrating the travel patterns **between** each of the 84 zones. Initially this created a matrix with just over 7000 cells (84 Superzones * 84 Superzones). TJKM then completed one additional step. Since the information in the matrix was directional (i.e. from Zone 1 to Zone 2, etc.) the matrix was "triangulated" so that the to and from trips between each zone pair were added together.

For example:

> The matrix initially displayed trips not only from Zone 1 to Zone 2, but also from Zone 2 to Zone 1. These are called directional trip patterns. In transit planning, directional trips patterns are not as important as total trip activity between two zones. To eliminate the directional aspect of the matrix, each zone pair was added together with its opposite to create a non-directional estimate of total trips. In other words, trips from Zone 2 to Zone 1 were added together with trips from Zone 1 to Zone 2 to create a single category called "Trips between Zones 1 and 2.

Figures 3-2 through 3-4 present the total daily person trip activity, plus a breakdown of vehicle trip activity, for Years 2001, 2010 and 2020. Estimated total daily person trip activity for Year 2001 is 2.4 million. By 2020, total daily person trips are expected to reach nearly three million, an increase of nearly **30%.**

Figure 3-1 Aggregated TAZs

(Map from graphics)

Figure 3-2 2001 – Total Daily Person and Vehicle Trip Activity

Daily Trips				
Period	**Daily**	**AM**	**PM**	**OP**
Purpose	**Persons Trips**	**Vehicle Trips**	**Vehicle Trips**	**Vehicle Trips**
Home Based Work	270,506	81,300	7,857	50,893
Home Based School	229,455	11,055	13,365	46,033
Home Based Other	733,913	60,847	40,931	148,395
Work Based Other	200,877	9,474	27,329	58,703
Other Based Other	915,515	54,645	130,157	412,582
Total	2,350,266	217,321	219,639	716,605

Figure 3-3 2010 – Total Daily Person and Vehicle Trip Activity

Total Daily Person Trips (2010)				
Period	**Daily**	**AM**	**PM**	**OP**
Purpose	**Persons Trips**	**Vehicle Trips**	**Vehicle Trips**	**Vehicle Trips**
Home Based Work	298,138	89,966	8,694	56,317
Home Based School	257,508	12,445	15,045	51,815
Home Based Other	822,942	68,475	46,063	166,997
Work Based Other	233,379	11,039	31,849	68,416
Other Based Other	1,069,062	63,962	152,342	482,907
Total	2,681,029	245,888	253,993	826,450

Figure 3-4 2020 – Total Daily Person and Vehicle Trip Activity

Total Daily Person Trips (2020)				
Period	Daily	AM	PM	OP
Purpose	Persons Trips	Vehicle Trips	Vehicle Trips	Vehicle Trips
Home Based Work	321,986	97,448	9,417	61,001
Home Based School	284,860	13,859	16,753	57,700
Home Based Other	904,215	75,550	50,822	184,252
Work Based Other	263,062	12,474	35,987	77,305
Other Based Other	1,203,189	72,263	172,116	545,590
Total	2,977,312	271,591	285,096	925,845

TRIP PAIRS AND ACTIVITY LEVELS

After the directional orientation of the trip pairs was eliminated, the number of pairs in the matrix decreased from over 7,000 to approximately 3,500. A review of the remaining pairs revealed trip activity levels ranged from a high of nearly 19,000 daily person trips to a low of almost zero. Further analysis indicated that the vast majority of the 3,500 trip pairs have activity levels which are far too low to be effectively addressed by public transit. For that reason, a cutoff level was established at 2,500 daily person trips. Using 2,500 as a threshold reduced the number of trip pairs from 3,500 to 200. Note – The remaining 200 trips pairs still account for nearly 40% of all trip activity. The 200 trip pairs are presented in Figure 3-5.

Years 2001 and 2010 – Initial assessment of trip activity

A quick glance at the top 25 trip pairs for Years 2001 and 2010 revealed two interesting types of activity:

Trips that stay within a zone

Some of the highest amounts of trip activity is, and will be, occurring completely within some zones. This includes:

- 32 Shaw near Fashion Fair Mall
- 24 Shaw near CSU Fresno
- 61 Downtown Fresno
- 30 West Shaw between BNSF tracks and Hwy 99 and south to Ashlan
- 67 Kings Canyon between Cedar and Peach
- 21 Area bordered by Marks, Sierra, Bullard and Hwy 41
- 37 Area bordered by Gettysburg, BNSF tracks, Hwy 41 and Shields
- 49 Area bordered by Duncan, the airport and Hwy 168

Activity between zones

Some of the leaders in this group include:

- 32 to/from 24
- 31 to/from 32
- 67 to/from 49
- 48 to/from 32

- 30 to/from 10
- 36 to/from 30
- 62 to/from 61

Year 2020 – Initial assessment of trip activity

What new single zones, or trip pairs, enter the top 25 pairs by 2020?

Trips that stay within a single zone

Additions to the top 25 pairs include:

- 34 East Shaw between Minnewawa and Fowler
- 10 West Fresno between Marks, BNSF tracks, Bullard and the SJ River
- 76 East Fresno between Peach, Fowler, Jensen and Pacific

Activity between zones

Additions to the top 25 pairs include:

- 30 to/from 9
- 41 to/from 34

Figure 3-5 Top 200 Origin-Destination Pairs

Year 2001				Year 2010				Year 2020			
	Daily person trips between				Daily person trips between				Daily person trips between		
Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips
1	32	32	18,923	1	32	32	17,333	1	30	30	16,845
2	32	24	16,373	2	32	24	15,571	2	32	32	16,012
3	24	24	14,936	3	30	30	15,212	3	32	24	14,686
4	32	31	13,153	4	24	24	14,517	4	24	24	13,895
5	61	61	12,421	5	61	61	12,460	5	67	67	12,316
6	30	30	11,980	6	32	31	12,189	6	61	61	12,256
7	31	21	11,871	7	67	67	12,108	7	32	31	11,343
8	67	67	11,631	8	31	21	11,041	8	31	21	10,296
9	37	32	11,124	9	37	32	10,187	9	68	67	9,578
10	61	56	10,363	10	61	56	9,911	10	37	32	9,418
11	32	21	10,217	11	32	21	9,441	11	61	56	9,381
12	48	32	9,585	12	48	32	9,015	12	75	67	8,788
13	37	31	9,221	13	30	20	8,730	13	30	10	8,771
14	21	21	8,989	14	37	31	8,604	14	32	21	8,731
15	37	37	8,664	15	68	67	8,524	15	30	20	8,700
16	49	49	8,226	16	21	21	8,377	16	48	32	8,547
17	30	20	8,024	17	75	67	8,297	17	34	26	8,399
18	31	31	7,913	18	37	37	8,006	18	10	10	8,214
19	32	23	7,836	19	49	49	7,919	19	30	9	8,176
20	33	24	7,818	20	36	30	7,828	20	41	34	8,068
21	48	37	7,770	21	33	24	7,745	21	37	31	8,049
22	67	49	7,641	22	32	23	7,707	22	34	34	7,998
23	62	61	7,568	23	67	49	7,668	23	76	76	7,958
24	75	67	7,477	24	62	61	7,557	24	33	24	7,813
25	36	30	7,448	25	30	10	7,459	25	21	21	7,787

Figure 3-5 Top 200 Origin-Destination Pairs (continued)

Year 2001				Year 2010				Year 2020			
	Daily person trips between				Daily person trips between				Daily person trips between		
Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips
26	67	61	7,428	26	31	31	7,392	26	10	9	7,696
27	56	46	7,366	27	34	26	7,390	27	36	30	7,623
28	34	26	7,143	28	30	21	7,374	28	67	49	7,538
29	48	48	6,769	29	67	61	7,370	29	49	49	7,518
30	30	21	6,743	30	48	37	7,317	30	30	21	7,504
31	41	34	6,718	31	24	14	7,174	31	32	23	7,466
32	56	56	6,689	32	41	34	7,065	32	37	37	7,459
33	68	67	6,666	33	56	46	7,034	33	62	61	7,447
34	49	48	6,531	34	34	34	6,823	34	24	14	7,391
35	37	21	6,463	35	31	30	6,657	35	26	26	7,386
36	21	12	6,428	36	48	48	6,569	36	34	33	7,319
37	24	14	6,416	37	10	10	6,541	37	67	61	7,204
38	34	34	6,388	38	34	33	6,497	38	48	37	6,979
39	33	32	6,378	39	30	9	6,472	39	31	31	6,937
40	21	20	6,279	40	21	12	6,465	40	31	30	6,734
41	34	33	6,225	41	26	26	6,261	41	56	46	6,720
42	24	21	6,145	42	49	48	6,236	42	76	67	6,438
43	31	30	6,089	43	56	56	6,224	43	48	48	6,411
44	39	32	6,056	44	33	32	6,022	44	76	68	6,323
45	38	32	6,035	45	32	30	5,975	45	61	60	6,217
46	61	32	6,026	46	37	21	5,971	46	21	12	6,170
47	41	24	5,990	47	41	24	5,881	47	30	29	6,161
48	46	37	5,954	48	61	60	5,836	48	30	19	6,106
49	26	26	5,910	49	24	21	5,829	49	72	61	6,094
50	61	49	5,897	50	32	13	5,828	50	33	32	6,019

Figure 3-5 Top 200 Origin-Destination Pairs (continued)

Year 2001				Year 2010				Year 2020			
	Daily person trips between				Daily person trips between				Daily person trips between		
Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips
51	30	10	5,820	51	21	20	5,771	51	49	48	5,999
52	56	47	5,762	52	46	37	5,705	52	68	68	5,956
53	57	48	5,753	53	61	49	5,643	53	32	30	5,955
54	32	13	5,722	54	34	24	5,634	54	9	9	5,943
55	31	24	5,632	55	26	24	5,629	55	21	10	5,914
56	26	24	5,618	56	39	32	5,629	56	41	24	5,880
57	61	47	5,606	57	61	32	5,626	57	34	24	5,827
58	34	24	5,589	58	10	9	5,618	58	26	24	5,812
59	32	30	5,582	59	21	10	5,604	59	56	56	5,742
60	61	46	5,561	60	37	30	5,591	60	32	13	5,717
61	46	36	5,537	61	38	32	5,577	61	83	76	5,627
62	61	60	5,466	62	61	47	5,552	62	37	30	5,563
63	61	37	5,465	63	72	61	5,506	63	30	18	5,559
64	47	37	5,437	64	56	47	5,469	64	37	21	5,543
65	49	32	5,411	65	57	48	5,459	65	24	21	5,505
66	61	48	5,326	66	61	46	5,424	66	41	33	5,467
67	21	10	5,315	67	31	24	5,380	67	32	14	5,465
68	37	30	5,311	68	32	14	5,366	68	14	4	5,437
69	10	10	5,264	69	46	36	5,289	69	46	37	5,436
70	56	37	5,263	70	24	23	5,286	70	61	49	5,436
71	24	23	5,245	71	61	37	5,199	71	61	47	5,406
72	41	32	5,234	72	61	48	5,180	72	61	32	5,373
73	67	64	5,180	73	30	29	5,174	73	41	41	5,326
74	37	36	5,147	74	76	67	5,136	74	39	32	5,264
75	34	32	5,105	75	76	76	5,133	75	21	20	5,243

Figure 3-5 Top 200 Origin-Destination Pairs (continued)

Year 2001				Year 2010				Year 2020			
	Daily person trips between				Daily person trips between				Daily person trips between		
Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips
76	31	20	5,090	76	47	37	5,126	76	46	30	5,216
77	48	47	5,078	77	46	30	5,122	77	61	46	5,208
78	48	24	4,875	78	68	68	5,073	78	56	47	5,188
79	41	33	4,864	79	67	64	5,043	79	57	48	5,187
80	32	14	4,856	80	49	32	5,007	80	75	61	5,172
81	66	61	4,792	81	75	61	4,988	81	38	32	5,164
82	61	57	4,780	82	34	32	4,954	82	24	23	5,162
83	46	30	4,748	83	41	33	4,948	83	31	24	5,119
84	46	46	4,624	84	41	32	4,938	84	34	32	5,090
85	75	61	4,618	85	48	47	4,890	85	6	4	5,077
86	62	56	4,615	86	56	37	4,869	86	61	48	5,005
87	57	49	4,590	87	37	36	4,765	87	61	30	4,976
88	72	61	4,574	88	76	68	4,760	88	46	36	4,960
89	49	41	4,522	89	61	30	4,759	89	67	64	4,956
90	49	24	4,518	90	30	19	4,750	90	14	13	4,943
91	74	61	4,499	91	48	24	4,745	91	41	32	4,943
92	61	30	4,472	92	41	41	4,704	92	61	37	4,937
93	41	41	4,470	93	31	20	4,648	93	76	75	4,913
94	32	26	4,465	94	14	4	4,574	94	4	4	4,892
95	47	46	4,398	95	46	46	4,564	95	33	26	4,823
96	23	21	4,342	96	61	57	4,564	96	47	37	4,815
97	47	32	4,263	97	14	13	4,539	97	48	47	4,763
98	67	66	4,172	98	66	61	4,517	98	24	4	4,723
99	37	24	4,147	99	32	26	4,490	99	14	6	4,699
100	33	26	4,135	100	49	41	4,488	100	24	15	4,685

Figure 3-5 Top 200 Origin-Destination Pairs (continued)

Year 2001				Year 2010				Year 2020			
	Daily person trips between				Daily person trips between				Daily person trips between		
Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips
101	64	49	4,123	101	62	56	4,437	101	49	32	4,643
102	24	13	4,104	102	24	4	4,426	102	32	26	4,637
103	41	26	4,045	103	74	61	4,371	103	41	26	4,623
104	30	9	4,037	104	23	21	4,305	104	14	14	4,603
105	56	48	4,036	105	57	49	4,288	105	24	6	4,598
106	31	12	4,030	106	33	26	4,282	106	49	41	4,574
107	48	46	4,005	107	47	46	4,258	107	48	24	4,571
108	32	20	3,976	108	24	13	4,195	108	27	26	4,502
109	32	12	3,939	109	50	49	4,147	109	56	37	4,500
110	30	29	3,930	110	41	26	4,132	110	13	4	4,486
111	61	36	3,930	111	4	4	4,101	111	46	46	4,456
112	48	31	3,901	112	49	24	4,068	112	68	65	4,436
113	36	31	3,872	113	31	12	4,042	113	37	36	4,382
114	57	47	3,871	114	32	4	4,038	114	33	33	4,347
115	33	33	3,869	115	67	66	4,023	115	62	56	4,320
116	56	32	3,838	116	24	15	4,015	116	61	57	4,316
117	57	32	3,822	117	47	32	3,992	117	68	49	4,313
118	63	61	3,815	118	13	4	3,991	118	66	61	4,262
119	24	4	3,812	119	21	13	3,986	119	31	20	4,254
120	61	21	3,812	120	14	14	3,970	120	32	4	4,230
121	21	13	3,792	121	33	33	3,961	121	50	49	4,211
122	50	49	3,789	122	48	46	3,952	122	26	15	4,189
123	46	32	3,734	123	37	24	3,951	123	6	6	4,185
124	36	36	3,728	124	68	49	3,935	124	74	61	4,185
125	39	24	3,717	125	32	12	3,916	125	12	7	4,177

Figure 3-5 Top 200 Origin-Destination Pairs (continued)

Year 2001				Year 2010				Year 2020			
	Daily person trips between				Daily person trips between				Daily person trips between		
Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips
126	36	32	3,716	126	64	49	3,911	126	50	41	4,177
127	68	68	3,715	127	56	48	3,844	127	75	68	4,166
128	20	10	3,699	128	20	10	3,824	128	23	21	4,160
129	61	31	3,678	129	68	65	3,794	129	24	13	4,151
130	14	13	3,668	130	61	36	3,731	130	47	46	4,133
131	31	23	3,662	131	48	31	3,721	131	44	30	4,120
132	67	32	3,648	132	76	75	3,695	132	57	49	4,069
133	38	37	3,610	133	50	41	3,692	133	20	10	3,986
134	32	4	3,552	134	57	47	3,692	134	67	65	3,980
135	20	20	3,528	135	61	21	3,655	135	21	13	3,955
136	56	30	3,483	136	6	4	3,654	136	21	7	3,953
137	36	21	3,475	137	63	61	3,641	137	76	61	3,909
138	56	36	3,433	138	24	6	3,639	138	7	4	3,904
139	30	19	3,429	139	31	23	3,635	139	18	9	3,900
140	48	39	3,425	140	56	30	3,627	140	31	12	3,898
141	49	37	3,411	141	32	20	3,614	141	67	66	3,889
142	46	31	3,406	142	39	24	3,607	142	8	4	3,855
143	24	15	3,391	143	36	31	3,592	143	48	46	3,848
144	47	47	3,385	144	67	65	3,591	144	49	24	3,847
145	48	38	3,380	145	12	7	3,572	145	32	12	3,792
146	67	48	3,377	146	30	18	3,558	146	56	30	3,772
147	36	20	3,275	147	67	32	3,556	147	15	14	3,760
148	68	49	3,269	148	9	9	3,555	148	47	32	3,757
149	10	9	3,232	149	61	31	3,545	149	26	14	3,752
150	48	21	3,228	150	46	32	3,544	150	64	49	3,748

Figure 3-5 Top 200 Origin-Destination Pairs (continued)

Year 2001				Year 2010				Year 2020			
	Daily person trips between				Daily person trips between				Daily person trips between		
Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips
151	49	47	3,188	151	21	7	3,529	151	13	7	3,747
152	61	24	3,179	152	56	32	3,510	152	19	9	3,732
153	57	56	3,158	153	75	68	3,500	153	37	24	3,724
154	37	20	3,126	154	67	48	3,494	154	4	1	3,700
155	61	41	3,101	155	57	32	3,480	155	56	48	3,680
156	74	67	3,090	156	27	26	3,474	156	75	75	3,673
157	56	31	3,082	157	36	36	3,425	157	18	18	3,568
158	14	4	3,075	158	36	32	3,407	158	48	31	3,559
159	57	37	3,053	159	44	30	3,402	159	6	1	3,557
160	56	49	3,051	160	14	6	3,373	160	32	7	3,552
161	13	4	3,047	161	38	37	3,340	161	8	7	3,539
162	67	57	3,043	162	48	39	3,335	162	57	47	3,531
163	76	67	3,026	163	75	75	3,330	163	31	23	3,530
164	23	13	3,017	164	68	61	3,310	164	61	36	3,512
165	30	24	2,999	165	23	13	3,308	165	68	61	3,490
166	46	21	2,994	166	30	24	3,291	166	63	61	3,483
167	48	41	2,994	167	47	47	3,281	167	39	24	3,451
168	49	33	2,992	168	46	31	3,243	168	61	21	3,446
169	50	41	2,989	169	36	21	3,241	169	67	48	3,408
170	64	61	2,971	170	13	12	3,224	170	67	32	3,395
171	21	11	2,960	171	48	38	3,222	171	61	31	3,391
172	44	30	2,878	172	8	4	3,192	172	23	13	3,377
173	13	13	2,871	173	13	13	3,186	173	46	32	3,365
174	62	47	2,871	174	76	61	3,185	174	13	12	3,363
175	27	26	2,864	175	32	7	3,156	175	19	10	3,353

Figure 3-5 Top 200 Origin-Destination Pairs (continued)

Year 2001				Year 2010				Year 2020			
	Daily person trips between				Daily person trips between				Daily person trips between		
Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips	Order #	Superzone	Superzone	# trips
176	68	61	2,855	176	56	36	3,149	176	30	24	3,329
177	32	10	2,854	177	49	37	3,146	177	12	10	3,318
178	49	34	2,848	178	26	14	3,125	178	13	13	3,306
179	47	31	2,827	179	20	20	3,122	179	36	31	3,283
180	67	56	2,813	180	61	41	3,114	180	7	7	3,262
181	14	14	2,795	181	7	4	3,111	181	32	20	3,259
182	75	75	2,795	182	83	76	3,111	182	56	32	3,248
183	31	13	2,793	183	67	57	3,073	183	48	39	3,224
184	4	4	2,784	184	48	21	3,068	184	83	67	3,208
185	67	24	2,775	185	32	10	3,040	185	32	10	3,204
186	75	49	2,758	186	61	24	3,036	186	57	32	3,202
187	31	10	2,744	187	49	47	3,035	187	24	1	3,198
188	67	63	2,742	188	74	67	3,033	188	47	47	3,193
189	48	36	2,722	189	13	7	3,010	189	38	37	3,131
190	12	12	2,718	190	75	49	3,010	190	75	49	3,127
191	13	12	2,712	191	26	15	2,998	191	61	41	3,123
192	67	65	2,704	192	36	20	2,964	192	65	49	3,108
193	56	21	2,692	193	12	10	2,963	193	36	32	3,092
194	67	41	2,691	194	12	12	2,963	194	31	10	3,086
195	40	24	2,681	195	48	41	2,951	195	46	31	3,083
196	40	32	2,650	196	49	33	2,915	196	48	38	3,070
197	48	30	2,635	197	57	56	2,913	197	36	36	3,069
198	12	10	2,613	198	31	13	2,906	198	48	41	3,051
199	67	37	2,613	199	31	10	2,904	199	56	36	3,005
200	24	12	2,590	200	21	14	2,904	200	21	14	2,998

Chapter 4. Planning Context

This chapter presents information and important findings gathered from a variety of sources including stakeholder interviews and a review of relevant documents.

DOCUMENT REVIEW

Several documents were reviewed for this project. A summary of these is presented in Figure 4-1. All reports that could have information impacting the outcome of this project were reviewed. A brief discussion of each report and any relevant findings which could impact this Long Range Transit Mater Plan follows the table. Documents are presented in their order of publication, starting with the most recent.

Figure 4-1 Document Review

Document Title	Author	Publication Date
Transit Productivity Evaluation FY 1999/2000	Fresno Council of Governments	Nov-00
Fresno 2000 General Plan	City of Fresno Planning Division	Sep-00
Short Range Transit Plan for the Rural Fresno County Area 2000-2005	Fresno Council of Governments	May-00
Survey of On-Board FAX Riders and Focus Group Discussion	Godbe Research and Analysis	Feb-00
Fresno County General Plan/EIR	EIP Associates and Fresno County	Feb-00
Data Summary - Handy Ride Customer Satisfaction	AIS Market Research	Dec-99
Short Range Transit Plan (1999-2004) for the Fresno-Clovis Metropolitan Area	Cities of Fresno and Clovis	Jun-99
1998 Regional Transportation Plan	Fresno Council of Governments	Oct-98
Fresno Area Express Transit Master Plan: A Study of Transit Alternatives Through the Year 2020	Wilbur Smith Associates	Nov-94
The City of Clovis General Plan	City of Clovis	Apr-93
Caltrans District 6 Strategic Initiative	Caltrans District 6	Jan-01
League of Women Voters Fresno Local Program for 1999-2000	League of Women Voters	2000
BNSF-UP Rail Consolidation	Fresno Area Residents for Rail Consolidation	Website
Fresno Area SkyTrain (FAST)	FAST	Website

Transit Productivity Evaluation FY 1999-2000

The Transit Productivity Evaluation, published in November 2000, is an annual document required to maintain TDA fund eligibility. It is primarily a 'numbers' document but FAX includes some significant analysis as well.

Potential Impacts

- The report suggests continuing to work with major employers to determine demand for new or improved services and, where possible, pursue private sector participation in the planning and delivery of new service.
- The report notes the need to coordinate with the Fresno County Department of Social Services to plan and implement transportation strategies focused towards the State mandated Welfare to Work (CalWorks) program.

Fresno 2000 General Plan

The Fresno 2000 General Plan, published in September of 2000, is the most recent update of the City of Fresno General Plan. The document was authored by the City of Fresno Planning Division and contains a section on transportation.

Potential Impacts

- The Plan promotes support of the proposed high-speed rail corridor along State Highway 99 to connect Los Angeles and San Francisco.
- The Plan supports evaluation of a modification to the city code that would provide for a maximum number of parking spaces allowed rather than a minimum number required on transit corridors where transit is a viable alternative.
- The Plan states that site improvements devoted to transit should be required for development occurring along transit corridors and that site developers should pay for these improvements.
- The Plan promotes the development of the 'Central Area' (downtown) as the region's employment center and transportation hub.

Short Range Transit Plan for the Rural Fresno County Area (2000-2005)

The Short Range Transit Plan for Rural Fresno County was published in May of 2000. This Plan outlines the short-term vision, operating plan and capital plan for rural areas of Fresno County.

Potential Impacts

- The plan primarily covers general goals and policies for rural Fresno County and has no recommendations that should have significant impact on transit in the Fresno-Clovis metropolitan area.

Survey of FAX Riders and Focus Group Discussion

This study was published in February 2000 and presents results and analysis of an on-board passenger survey and focus group discussion. It covers various aspects of FAX rider's attitudes towards the FAX service. *Most of the information from this study is geared towards short term service and marketing improvements*

Potential Impacts

- When resources allow it, FAX riders would like to see increases in weekend evening service and general morning service. Riders also support increased marketing and education of the public regarding FAX services.

Fresno County General Plan EIR

This document, published in February 2000, is the public review draft General Plan environmental impact report for the County of Fresno.

Potential Impacts

- The Plan states the county shall support development of the state-wide high-speed rail service.
- The Plan supports creation of multi-modal stations to integrate rail with other transportation modes.
- The Plan encourages county cooperation with transit service providers to pursue available sources of funding.

Handy Ride Customer Satisfaction Survey

This phone interview survey of FAX Handy Ride customers was completed in December 1999. The goal of the study was to research Handy Ride customer attitudes regarding existing service and their preferences for system improvements.

Potential Impacts

- None – *Most of the findings are geared towards short term service or customer relations issues.*

Short Range Transit Plan (1999-2004) for the Fresno Clovis Metropolitan Area

The Short Range Transit Plan, published in 1999, presents the goals, objectives, financial plan, business plan and capital plan for transit in the Fresno-Clovis Metropolitan area over the next five years. The plan covers general goals and policies as well as specific short-term plans.

Potential Impacts

- An on-board survey of fixed route riders revealed a substantial demand for more evening service.
- The Plan suggests some type of circulator service for South East Fresno to serve new trip generators by connecting them to trunk routes.
- One major goal during 2000 and 2001 is to evaluate service improvements such as weekend, evening and circulator/tripper services.
- The Plan promotes the evaluation of ITS technologies including Smart Card Fareboxes, Automatic Passenger Counters, and Real Time Customer Information Services.
- The Plan suggests evaluating the potential for more route terminals at common locations to facilitate interlining, transfers, circulator services and park and ride facilities.

1998 Regional Transportation Plan for Fresno County

The Regional Transportation Plan (RTP) is a comprehensive assessment of all forms of transportation available in Fresno County. The RTP examines needs for travel and goods movement for a twenty-year period. RTP's are usually updated every two years.

Potential Impacts

- The RTP recommends an increased service area and service frequency for FAX fixed routes.

Fresno Area Express Transit Master Plan: A Study of Transit Alternatives through the Year 2020

The Transit Master Plan, published in 1994, is Fresno's most recent long-range transit plan (LRTP). It defines a vision for public transit in Fresno through 2020 and direction for implementing the vision. Short and long-range needs are discussed in the Plan.

Potential Impacts

- The Plan recommends promotion of large activity centers and transit oriented development along principal transit corridors.
- The Plan notes the need for a downtown transit circulation study to define a service hub plan for FAX that is responsive to downtown development and traffic changes.
- The Plan suggests revising off-street parking requirements in a manner consistent with trip reduction strategies.

City of Clovis General Plan

The City of Clovis General Plan was published in 1993 and is the most recent General Plan update. The Plan contains a section that covers transportation, including public transit.

Potential Impacts

- The Plan recommends acquiring additional railroad right-of-way to support future multi-modal transportation options.

Caltrans District 6 Strategic Initiative

This document outlines a number of initiatives and proposals which are needed to protect and enhance the region's transportation systems.

Potential Impacts

- The objective of Proposal #5 is to "...prevent future congestion on the $1 billion new freeway system that is under construction in the greater Fresno area." This statement would seem to indicate that Caltrans would be open to supporting public transit improvements (capital or operating) that help minimize congestion on the local freeway network.

League of Women Voters Fresno (1999 Local Program)

The Local Program outlines the positions that the local chapter will take on a variety of community oriented issues such as land use planning, social policy and transportation. The current transportation issue was adopted in 1984 and amended in 1987.

Potential Impacts

Objectives from the transportation program which may have an impact on this study include:

- Formation of a Fresno Regional Transit District with both planning and implementation authority.

- Alternatives to the private automobile.
- A public transit system that: a) has a flexible schedule that meets the needs of the community and outlying areas and b) gives priority to those dependent upon public transportation.
- Incentives to promote use of public transit.
- Measures for public transit requiring: a) designating a specified amount of locally generated funds each year for public transit and b) providing a local share of funds sufficient to meet local transit needs.
- Public transit policies that are consistent with sound land use plans and clean air requirements.

Rail Consolidation (2001)

The Burlington Northern Santa Fe Railroad tracks bisect a large portion of Fresno between Highways 41 and 99. Over 40 trains per day travel along this line through Central Fresno. This train traffic negatively impacts traffic public safety, public health and traffic conditions on intersecting arterials. FARRC (Fresno Area Residents for Rail Consolidation) has orchestrated a campaign to remove rail traffic from the BNSF line and consolidate it with other rail traffic on the Union Pacific mainline adjacent to Highway 99.

<u>Potential Impacts</u>

- From a transit operations perspective, eliminating rail service along the BNSF line would have a positive impact on FAX fixed route on-time performance and service reliability, especially for Routes 9, 22, 28 and 32. Consolidating rail service along the UP mainline would probably not have a negative impact on any of the routes.

Fresno Area Sky Train

F.A.S.T. (Fresno Area Sky Train) is a concept being proposed by citizens in Fresno and Clovis for improving urban mobility via a monorail system. The F.A.S.T. Committee, lead by local businessman Deryl Behr, believes that a monorail system, as opposed to a traditional bus, Bus Rapid Transit, Light Rail or subway system, is the only truly cost effective way to address the region's long term public transit needs. According to information listed on the F.A.S.T. website:

> "…the backbone of the system will be a fully automated elevated rail system with 'direct access' which will place people directly inside their destinat

The F.A.S.T. system would consist of a mainline running along north-south Blackstone between downtown and Woodward Park. There would be five east-west intersecting lines running approximately along:

- Kings Canyon Road
- Dakota/Shield Avenues
- Shaw Avenue
- Herndon Avenue (east and west)

Stations would be located every half-mile. Operating hours, days or service frequency are not listed on the F.A.S.T. website.

The F.A.S.T. committee is currently trying to hire research staff at CalPoly San Luis to conduct a feasibility study of the proposed system.

FAX Coach Operator Interviews

Coach Operator input is often useful for planning purposes because the operators are intimately familiar with their routes and can provide first-hand accounts of passenger overloads, common traffic delays, and inadequate schedules.

An open house was held in the FAX driver break-room on March 8th, 2001 to solicit driver input about long term and short term issues. Several drivers had constructive comments that provided excellent accounts of how operations currently work in the field. General comments that pertain to the entire network are presented in Figure 4-2. *Specific comments about individual routes can be found in the Route by Route discussions in Appendix B*.

Figure 4-2 FAX Coach Operator Comments

	Comments
-- >	Instead of using transfers that only work once, consider the idea of "buying time" where the passenger can make an unlimited number of transfers within a certain time period.
-- >	Add more signal time to the left turn for buses coming out of the Manchester Transfer Center.
-- >	Overloads are making it difficult to keep schedules during the peak hours. A significant increase in ridership, coupled with an increase in traffic congestion, has occurred over the last few years. This means that it takes longer for each trip than it did five years ago, yet the schedules have not changed in ten years.
-- >	Consider a circulator route south and west of Belmont.
-- >	Add more cross-town east-west routes to the system.
-- >	There is a shortage of functioning buses in the system right now. At times there is no bus available for school trippers. This leads to large overloads for the buses that are out there.
-- >	Put time-points and layovers at the Marketplace. This spot should function as a transfer center.
-- >	Add a loop route going around town along Herndon, Blythe, Jenson and Clovis.

SUMMARY OF STAKEHOLDER INTERVIEWS

During the week of June 4, 2001, Nelson\Nygaard staff conducted face-to-face interviews with a variety of key stakeholders including:

- Fresno City Council Members
- Clovis City Council Members
- Fresno County Supervisors
- League of Women Voters
- Caltrans District 6
- Fresno County Economic Opportunities Commission
- Greater Fresno Chamber of Commerce
- Council of Fresno County Governments (COFCG)

Question 1. What is your perception of the FAX transit system?

- Generally hear few complaints
- System does about a well as it can given its limited resources
- Service needs to be more frequent
- FAX needs to decrease crosstown travel times to attract more riders
- Service needs to run later in the evening
- FAX should use smaller buses on neighborhood streets
- FAX should cut back midday service and increase commute service?

Question 2. What do you think of the "FAST" concept?

- Skytrain is an interesting concept, but it's too much for Fresno and the area could never afford to build and operate it!!! Instead, the region should focus on developing a high quality bus network.
- Maybe beyond 20 years this concept might have some applicability but certainly not within 20 years.

Question 3. Do you see a need for Light Rail Transit (LRT)?

- LRT probably is not needed within the next 20 years. It's too expensive and it's "more than we need." Instead, the region should focus on developing a high quality bus network.

Question 4. What is the future role of public transit in the region?

- Neither Clovis nor Fresno is likely to build housing at a density which can realistically support LRT or Monorail. Development over the next 20 years will essentially continue much as it has for the past ten years…that is, more low density residential housing tracts with adjacent "big box" retail. There might be a few exceptions to this pattern, like transit villages along Blackstone, Ventura or near CSU Fresno.
- Most residents in the region are probably not going to give up their cars until they are forced to do so by either: a) a shortage of parking; b) a significant increase in parking rates; c) a significant increase in the cost of driving a car; or d) a decrease in transit travel times to the point where transit becomes very competitive with the auto. Until one or more of these things happen, public transit should focus on doing the best it can to serve the transit dependent members of the public.
- If transit is going to successfully tap into a community issue, it will have to be traffic congestion. Nothing else is as important to the "solo driver."

- Most of the stakeholders were either moderately or very supportive of public transit, assuming that its role and objectives are realistically and clearly defined.
- Most stakeholders do believe that local transit service needs to evolve to the next step. Transit can't, and shouldn't, try to be everything to everybody, but it must go beyond its traditional social service role to try and attract some choice riders. The next step should look something like this…build a bus system with high frequency service on the densest corridors, or those with redevelopment potential, and then provide circulator, low frequency services everywhere else. Key corridors for high frequency service should be Blackstone, Shaw, Ventura/Kings Canyon and Herndon.
- Stakeholders question whether transit service should be provided throughout the entire region, or whether it should be limited to those areas where it can be truly effective. They recognize that under this approach, some areas which currently receive service may not receive any in the future. For example, transit needs north of Shaw Avenue might be very limited. Perhaps most transit service should be concentrated south of Shaw with only a limited amount north of Shaw.
- Whatever system is developed must have good coordination with the proposed High Speed Rail.
- Most stakeholders don't really think LRT is "part of the answer."
- FAX needs to get serious about providing a more attractive "product." Better looking and more comfortable buses, better passenger amenities (waiting areas, lighting, benches, security, convenience items, etc.).
- Need to have better outreach to employers, employees and general public about role of public transit in the community and how it can be used to meet some community objectives.
- Somehow transit can/should play an important role in addressing downtown parking problems. Maybe the City should explore moving most employee parking to remote parking lots, which would be connected to downtown offices via fast and frequent shuttles.
- One of the roles that transit should "play" - Show that a comprehensive transit system will help support in-fill development which in turn will protect valuable agricultural land and resources!
- Most stakeholders understand that transit can't be used to improve air quality unless it can attract choice riders, and it can't do that without a great commitment of resources.

Question 5. Is there a need to move towards a regional transit system?

- Taking a regional approach to transit might not be a bad thing! Very few of the stakeholders are sure if a JPA (Joint Powers Authority) or a transit district is the right answer, but it's an idea worth exploring. Having a regional system might make it easier to coordinate services and possibly reduce costs.

Question 6. What do you think about the Measure C Extension Program?

- There was no clear consensus amongst stakeholders on whether the Measure C Extension will pass. In any event, it will likely be a close race given the 2/3 majority required for passage.
- Many stakeholders would support using some Measure C funds to "increase transit service" (i.e., support increased operations).
- Measure C should include some money to improve passenger amenities like transit centers and bus stops.

Other Issues

- Most city representatives indicated that their cities would be willing to contribute some local funds to support transit capital projects designed to decrease bus travel times along key corridors. This would include capital programs like queue bypass, pullouts, far side stops and signal pre-emption along major arterials like Shaw, First, Blackstone, etc.

Chapter 5. Summary of Important Findings and Planning Issues

The previous chapters presented data and information from a variety of sources including a review of documents, stakeholder interviews, travel patterns from the COFCG Travel Model and an analysis of development density. In this chapter that information is pulled together to create a list of planning issues and needs that will ultimately guide the service planning effort.

Reminder - This project has two primary objectives:

1. Develop a Long Term (2020) vision for public transit
2. Develop a Five Year Short Term Plan that supports the longer term vision

IMPORTANT FINDINGS

Some of the most important information and data discovered to date include:

Chapter 1 System Overview

The FAX fixed route system is performing at a rate that many larger cities might envy. FAX is projecting that the system will carry just over 43 passengers per revenue hour during FY 2000/01. The work-horse routes in the system include 28, 26, 30, 38 and 32. Each of these routes carries between 45 and 50 passengers per revenue hour. Recent service improvements over the last few years, especially the addition of evening service, have done much to make the system more accessible and convenient. It's important to note that even with the addition of new services, the growth in ridership has outpaced the growth in population every year over the last five years. This underscores the importance of the system and the role it plays in serving its existing markets.

FAX's cost/passenger of $1.67 is very reasonable given the size of its service area and its operating parameters.

In many systems it's possible to find a number of poorly performing routes which can be eliminated, allowing their resources to be reallocated to more productive services. This is often called 'trimming off the bottom." A review of the FAX system reveals that there are few, if any, poorly performing routes which can be eliminated to free up resources for other uses. The lowest productivity, all-day route is 18, which still manages to carry over 25 passengers per hour. Routes 29, 58 and 59 are truly low productivity routes which each carry fewer than ten passengers per hour. However, since they do not operate all-day, their elimination would result in only a minimal savings of resources.

Chapter 2 Population-Employment Densities

Through experience, N\N has found that density of development, population and employment, tends to be the factor exerting the greatest influence over transit demand and usage. This is important to understand, because one of the questions that will be asked during the service planning phase is…should transit try to serve the entire metro area, or should it focus on serving only those areas where it has the greatest opportunities for success (i.e. areas with High or Very High density)?

Areas which currently have a Very High level of density include:

- Downtown Fresno
- Central Fresno (between Clinton/Millbrook/Dakota/Fresno)
- North Central Fresno (between Gettysburg/Cedar/Barstow/Hwy 41)
- Southwest Fresno (between Belmont/Orange/Butler/Maple)
- Clovis (south of Shaw, between Willow/Minnewawa)

By 2020, a number of other areas will move into the High or Very High development density range including portions of :

- Southwest Fresno
- Southeast Fresno
- East Fresno
- North Central Fresno
- West Fresno
- Clovis

Many of these new areas, East Fresno and North Central Fresno, currently receive little or no service. The system will need to grow (increase revenue hours) to serve these areas. This growth will be above and beyond any service increase which might result from a policy decision to provide more frequent service.

Chapter 3 Origin-Destination Travel Patterns

Estimated total daily person trip activity for Year 2001 is 2.4 million. By 2020, total daily person trips are expected to reach nearly three million, an increase of nearly 30%.

What are some of the areas of highest trip activity?

Years 2001 through 2010

Trips within the same zone:

- The areas bordering Shaw Avenue between Fruit Avenue and Sierra Vista Mall
- The areas bordering Shaw Avenue between the BNSF tracks and Highway 99
- Areas immediately adjacent to CSU Fresno
- Kings Canyon between Cedar and Peach
- The area bordered by Marks, Sierra, Bullard and Hwy 41
- The area bordered by Gettysburg, BNSF tracks, Hwy 41 and Shields
- The area bordered by Duncan, the Airport and Hwy 168

Trips between zones

- Trips in/around Shaw all the way from Fruit to CSU Fresno
- Trips between Chestnut\Kings Canyon area and Chestnut/McKinley area
- Trips between First/Shields area and First/Shaw area
- Trips between West Shaw/Valentine area and West Herndon/Brawley area
- Trips between Hughes/Dakota area and West Shaw/Valentine area
- Trips between Belmont/Blackstone area and Downtown

Year 2020

Trips that stay within a single zone

As Year 2020 approaches, FAX will need to be aware of the following zones, because of their large increases in trip activity:

- East Shaw between Minnewawa and Fowler
- West Fresno between Marks, BNSF tracks, Bullard and the SJ River
- East Fresno between Peach, Fowler, Jensen and Pacific

Trips between zones

In addition, two new pairs join the top 25 pairs in terms of activity between zones:

- Trips between West Shaw\Valentine area and West Herndon Hayes area
- Trips between Ashlan/Clovis area and Shaw\Clovis area

Chapter 4 Planning Context

There are a number of existing policies which support improvements in public transit. These can be found in the County's General Plan, the Regional Transportation Plan and the City of Fresno General Plan. In addition, a number of non-profit and private citizen groups are involved in various activities intended to improve, directly or indirectly, public transit services. These groups include FARRC, the League of Women Voters and F.A.S.T.

Stakeholder Interviews

The extensive interviews with stakeholders revealed several important findings:

- FAX seems to do a fairly good job, given that the system has a limited amount of resources at it's disposal.
- Most people like the "idea" of Light Rail and Monorail systems, but they do not see either one as a viable option for addressing local transportation issues over the next 20 years. One reason for this is that neither Clovis nor Fresno is likely to build housing at a density which can realistically support LRT or Monorail. Local leaders believe that development over the next 20 years will essentially continue much as it has for the past ten years...that is, more low density residential housing tracts with adjacent "big box" retail. It may, however, be possible to create a few exceptions to this pattern, such as transit villages along key corridors like Blackstone, Ventura or Shaw.
- Transit must be realistic about the role it can/should play. Most residents in the region are probably not going to give up their cars until they are forced to do so by either: a) a shortage of parking; b) a significant increase in parking rates, c) a significant increase in the cost of driving a car; or d) a decrease in transit travel times to the point where transit becomes very competitive with the auto. Until one or more of these things happen, public transit should focus on doing the best it can to serve the transit dependent members of the public.
- If transit is going to successfully tap into a community issue, it will have to be traffic congestion. Nothing else is as important to the "solo driver.
- Most stakeholders do believe that local transit service needs to evolve to the next step. Transit can't, and shouldn't, try to be everything to everybody, but it must go beyond its traditional social service role to try and attract some choice riders. The next step should look something like this...Build a bus system with high frequency service (every 15 minutes?) on the densest corridors, or those with redevelopment potential, and then provide circulator, low frequency services everywhere else. Key corridors for high frequency service should be Blackstone, Shaw, Ventura/Kings Canyon and Herndon.
- Stakeholders question whether transit service should be provided throughout the entire region, or whether it should be limited to those areas where it can be truly effective. They recognize that under this approach, some areas which currently

receive service may not receive any in the future. For example, transit service north of Shaw Avenue might be very limited. Perhaps most transit service should be concentrated south of Shaw with only a limited amount north of Shaw.

- Somehow transit can/should play an important role in addressing downtown parking problems. Maybe the City should explore moving most employee parking to remote parking lots, which would be connected to downtown offices via fast and frequent shuttles.
- There is no clear consensus amongst stakeholders on whether the Measure C Extension will pass. In any event, it will likely be a close race given the 2/3 majority required for passage. Stakeholders did indicate that they would support using some Measure C funds to “increase transit service” (i.e., support increased operations).

Chapter 6. Transit's Role in Urban Life (Short and Long Term)

What is Transit?

Transit is a service that can transport multiple people on the same vehicle for some part of a trip that they area all making, even though those people may have different origins, destinations, and purposes.

While some transit systems began as private businesses, today's urban transit systems are usually thought of as part of the civic infrastructure – essential public services like police, fire and water. While transit requires public funding, the same is true of all other transportation modes, whether it be the construction of roads for cars and trucks, lanes for cyclists, or sidewalks for pedestrians.

Transit Efficiency and Density

While virtually all transit requires subsidies, the degree of subsidy required to serve each passenger varies enormously. The key point in understanding transit costs is that time is literally money; 80% of transit's operating costs are in the driver's salary and benefits, which are based, of course, on time. A bus stuck in traffic, for example, is not only wasting the passengers' time, it is wasting the public's money in the form of the driver's salary.

A highly efficient transit system (that is, one with a low subsidy per passenger) is one that carries as many people as possible for the lowest possible cost. Since time is money, this means carrying as many people as possible in the shortest possible time. For this reason, the most efficient transit services in the world (and the most efficient services in Fresno) are those that are lined with many residences and destinations close to a transit stop. Why? Because the more of these "origins and destinations" there are over a given linear distance, the larger the potential market for transit will be.

In other words, high-productivity transit (transit with a low subsidy per passenger) thrives on:

<u>linear or nodal patterns of density</u>, so that there is a continuous market of people and destinations within walking distance of stops or stations on a reasonably straight transit line.

<u>walk-ability of neighborhoods and arterials</u>, since it must be possible for people to walk from their origins and destinations to transit stops or stations.

<u>fast operations</u>, typically achieved by operating on uncongested arterials, or in more advanced cases, by using an exclusive right-of-way such as a rail corridor or a dedicated lane, which reduce transit's vulnerability to congestion. The most

cost-effective transit system would concentrate its service on those areas where both of these features are strong.

These are the keys to a highly productive system, one that maximizes vehicle trip reduction and minimizes subsidy per passenger. However, that may not be the only purpose that FAX exists.

TRANSIT'S TWO PURPOSES

In most cities, transit exists to serve a diverse range of purposes, including community goals for environmental quality, redevelopment, and mobility for people who cannot drive, among many others. For local systems, the expectations that we place on transit tend to fall into two broad categories: Productivity and Coverage.

Productivity: Maximize Ridership Per Unit of Cost!

Productivity can mean maximum ridership per unit of service time (and hence of cost). While it is usually measured this way (as boardings per hour of service), some people prefer to think of operating cost per passenger. All of these measures are closely related and speak to how intensely the system is being used.

The Productivity goal is to maximize ridership per unit of cost. This goal actually encompasses several diverse purposes that happen to align with each other:

Vehicle Trip Reduction – The more people transit is carrying, the fewer are driving. While many transit passengers may not be candidate drivers themselves, many would be chauffered to their destinations, generating auto trips if transit were not available.

Air Quality – Obviously, this goes with vehicle trip reduction. In addition, because lower-income persons tend to drive older cars, attracting them to transit can improve air quality to a degree that is out of proportion to their numbers.

Minimizing Subsidy or "Running Transit Like a Business" – Although transit in the U.S. does not make money, a lower subsidy per rider obviously brings a system closer to self-sufficiency.[1]

Regional Redevelopment – To the extent that the city wishes to encourage new development within the existing built form of the city, rather than just "greenfield" development that extends the city's area, a Productivity-oriented system is most likely to provide the services needed to support new density and infill, and mitigate the traffic impacts of such projects.

[1] Again, self-sufficiency is not a realistic goal for any mode of transit, because the modes competing with it are so heavily subsidized.

The key to a Productivity-oriented system lies in the idea of "running transit like a business." Any successful business chooses which customers it will pursue. For example, one of the nation's few profitable airlines, Southwest, does not serve cities below a certain size, because while those cities may have air travel needs, the market is not large enough to reliably fill their planes.

A Productivity-oriented system, then, will "choose its markets," running high-quality service where demand is high, and little or no service where demand is low. Obviously, since transit is a public service paid for by all taxpayers, the Productivity goal must be balanced against its opposite, the need to provide some benefit to everyone. The opposite of the Productivity goal is the Coverage goal described below. Every agency must strike a balance between them.

Coverage: Provide Some Service to Everyone!

The Coverage goal reflects the desire to provide some service to everyone, even though some of this service will carry few riders. Coverage-oriented service penetrates parts of the community where transit cannot expect to operate with high productivity, either due to low densities or a built environment that is unsafe and unpleasant for pedestrians.

The Coverage goal is important to many constituencies, including:

Transit-dependent persons in low-density areas – Like many cities, Fresno houses some of its lower-income residents in sparsely populated, semi-rural areas. Isolated apartment buildings and mobile home parks form small pockets of demand, but their remoteness makes them unproductive to serve.

Major destinations and residences in transit-inaccessible areas – Herndon Avenue is a classic example of a street where there are many places people might want to go on transit – including medical destinations and employers – but the physical configuration of the street makes it impossible to site safe and comfortable transit stops. As a result, transit must meander on side streets, yielding slow and expensive operations that will not attract many riders.

Social Services – To the extent that major social services have located on inexpensive land in remote areas, the trips to these services become expensive and unproductive for transit to serve. Social service agencies are frequently located in industrial parks, minor strip malls, and other locations that are often far from transit, which forces transit to make awkward deviations to serve them, pulling down productivity.

Some Senior and Disabled Constituencies – While it is possible to create a Productivity-oriented service that will attract senior and disabled riders, these groups have a lower tolerance for walking or wheeling themselves to a transit stop. A Productivity-oriented system typically spaces transit lines about every 1/2 mile, with the understanding that most customers will walk up to 1/4 mile to transit. However, senior and disabled communities sometimes demand services that are closer together, even though these services are inevitably less productive because the markets of parallel lines overlap.

Local Development and Redevelopment – While regional goals for redevelopment are well-met by a Productivity-oriented system, constituents who have a financial or personal stake in a particular development may demand service to their neighborhood or project, regardless of whether this service is productive by regional standards. A great deal of Coverage-oriented, low-ridership service is often created for this reason.

Important Note: Routes or Lines?

The words "route" and "line" are used interchangeably in most of the transit industry, but while their meaning is the same, their connotations are different. "Route" connotes a path followed by a vehicle, while "line" connotes a fixed object in space. The more frequently and reliably a service operates, and the more extensive its fixed facilities, the more likely it is to be called a line. For example, few people would refer to BART's (Bay Area Rapid Transit) rapid rail services as "routes."

Because of this connotation, this report uses the word "line" to denote services that are - or are intended to evolve into - frequent services with extensive amenities such as high-quality shelters, etc. (In the 2020 Plan, later in this report, we refer to these services collectively as the Primary Transit Network.) The word "line" here is appropriate regardless of whether the vehicle is a bus or (in the future) some form for rail.

This report uses the word "route" to denote services that are not expected to evolve into high-frequency, concentrated services, such as the intrinsically dispersed "flex routes" discussed under Scenario B.

Chapter 7. Short-Term (2005) Scenarios

At the direction of FAX staff,[1] Nelson\Nygaard prepared two scenarios for how the Fresno Area Express system might look in 2005. Both scenarios assumed a 25% growth in operating resources. Staff directed that these scenarios differ by purpose:

- Scenario A is devoted solely to the goal of Productivity. It focuses all resources toward maximizing systemwide ridership, with the benefits indicated. As a result, it cuts service to some areas that currently generate low ridership, while increasing the frequency of service to every 15 minutes all day in areas of high ridership. This scenario would increase not just ridership, but also productivity. That is, the percentage increase in ridership will be substantially greater than the percentage increase in service. For a 25% increase in service and a system solely devoted to Productivity, ridership growth in the range of 35 – 50% is conceivable.
- Scenario B retains coverage to all areas now served, and even expands the coverage area to include most developed parts of the city. Relatively few improvements are made to increase Productivity, though some frequencies are improved. About 12% of the system is devoted to Coverage in this scenario. This scenario is likely to increase the growth rate in ridership slightly, but not nearly to the level that Scenario A would do.

[1] Meeting between Nelson\Nygaard and FAX senior staff (8/14/01).

IDEAS COMMON TO BOTH 2005 SCENARIOS

1. Multidestinational Service: The Grid Concept

Like many comparable cities, Fresno is highly decentralized. The historic downtown is only one of many major destinations. Others include the CSU campus in northeast Fresno, the Community College and the surrounding Tower district, shopping malls in several parts of the city, and the many major hospitals. These large institutions draw customers, clients and employees from all over the city. An effective transit system, then, cannot focus solely on downtown, but must offer ways of getting from multiple possible origins to multiple possible destinations.

Given Fresno's geography, the most versatile possible design for a transit system – that is, the one that can be used conveniently for the widest range of trips – is a grid pattern of transit lines running at high frequencies. In an ideal grid system, north-south and east-west lines are spaced every half mile, each following a major arterial all the way across the region. If these lines run every 15 minutes or better all day, then it is possible to travel from anywhere to anywhere else with, at most, a 1/4 mile walk to a stop, a 15 minute wait for the bus, a 15 minute wait to connect, and a 1/4 mile walk to the destination. This is the absolute worst case for any trip in the grid area; the average delay will be far less.

Grid systems have other advantages. Each line is associated with a particular arterial, so the system is as simple to remember as the street system itself. Routes are straight, which means that passengers perceive them as being as direct as they can be. Often, a grid transit trip uses exactly the same streets you would use if you were driving. Straight lines require fewer turns, which tends to mean less delay and a lower risk of accident.

Fresno's street pattern is ideal for a grid transit system. The city has a consistent pattern of arterials spaced every 1/2 mile. These arterials provide a framework for offering transit services that require a maximum walking distance of no more than 1/4 mile. Of course, not all of the urban area has the density of development needed to support a high-frequency grid, but an extensive area does have such a density, if the resources were there to serve it.

However, today's transit system is far from offering the high-frequency service that makes a grid system work. Virtually all of the City's current transit lines run every 30 minutes all day, with only one (Line 30-Blackstone/West Kearney) running every 20 minutes. These frequencies are insufficient to provide fast connections. Connections between lines are crucial to mobility in Fresno, because origins and destinations are so widely dispersed that it would be impossible to run direct service from everywhere to everywhere else.

Grid lines sometimes do logically bend. The current structure provides a rough grid network, but lines passing close to a major destination, such as downtown, CSU, or a major transit center, may deviate to serve it more directly. It is especially easy for lines to converge downtown because the downtown sits on a diagonal grid, offering easy ways for parallel lines to come together without seeming to take passengers out-of-direction.

As an arterial nears the end of its area of high demand, a line may also bend so that it ends at a major destination; many north-south lines, for example, bend at the their northern ends to converge at the Riverpark shopping center at the north end of the City, on Blackstone between Alluvial and Nees.

Finally, L-shaped lines often make sense in a grid system. If a grid line reaches the end of the densely developed area but is nowhere near a major destination where it could logically end, it often makes sense to turn 90 degrees and begin another grid moment. For example, Line 41 covers Shields Avenue, but at the east end, where Shields ends as a market near Chestnut, the line turns south to become the Chestnut line. This tool will continue to be useful, though it must be used in moderation because if a line makes too many L-turns, it will fold back on itself confusingly, and it may be impossible to associate the line with an arterial clearly in the public mind.

A logical transit system for Fresno, then, will have the pattern of a grid in the area of the city that is dense enough to support the frequencies required (typically residential densities of seven dwelling units per acre or higher interspersed with major commercial or institutional destinations). The grid lines in this area would constitute the Productivity-oriented system in the short term (through 2005). Low-density (and therefore low-ridership) areas beyond the grid area would be served by Coverage-oriented lines feeding into transit centers at the edge of the grid, if they are served at all.

2. Transit Centers as Anchors and Transfer Points

Transit centers logically emerge at the edges of a grid system because lines perform better if they end at major destinations. In most grid systems, lines approaching the end of the high-density grid area bend to converge on a point where it can connect with other lines and also serve a destination of interest. These endpoints, called anchors, tend to make for stronger lines, because they give people a reason to ride the line all the way to the end. If demand were equally dispersed along all points on a line, ridership would tend to fall near the end of a line because the bus is going to fewer places as it nears its endpoint, and therefore is valuable to fewer riders.

Many of Fresno's lines are already anchored, notably at Riverpark at the north end of the city. The proposed service plans all propose a major increase in anchoring, so that major lines tend to end at major transit centers that lie along the periphery of the dense part of the city. In scenarios where low-ridership Coverage-oriented service is included for outer low-density areas, this service would take the form of feeder routes extending further out from one of these transit centers, in either a fixed-route shuttle or demand-responsive mode depending on the needs of the area.

Some form of transit center is recommended for all of the following terminal locations:

- **Northwest Transit Center: San Jose and Brawley** (near Shaw). This new hub would help to organize northwest-area services, and provide a terminal for many major lines. Nearby destinations include a Wal-Mart and other major commercial sites, as well as extensive and growing apartment development.
- **North Riverpark Transit Center: Blackstone and El Paseo** (Riverpark). With a few exceptions, high-density development does not extend north of Nees Avenue, so this will continue to be the northern extreme of the grid system. Major north-south lines would bend to converge here. Coverage-oriented services emanating from here could include east and west Herndon Avenue services, shuttles to Children's Hospital and St. Agnes Hospital, as well as service to the generally low-density area north of Nees Avenue.
- **CSU Fresno.** The service plans assume that CSU continues to be served mainly by onstreet operations on Shaw and Cedar, but campus planning should consider the possibility of an offstreet transit center more convenient to the campus core. If Clovis retains a separate transit system, it might also anchor here.

New Transit Centers will provide the system with important anchors.

- **East Riverpark Transit Center: Clovis and Belmont** (Riverpark II). The proposed new shopping center just south of the SR 180 freeway on Clovis Avenue would be the logical terminus for Olive, Belmont, Tulare, and Ventura/Kings Canyon lines. Clovis service might also want to connect here.
- **Southeast Transit Center** (Lamb and Winery, near Kings Canyon and Chestnut). This node would be the southern end of the Chestnut and Peach grid lines (densities drop dramatically south of here), and also the eastern end of the Butler line. In a Coverage scenario, some Chestnut trips could continue south to Malaga, and a new demand-responsive service is proposed for the area southeast of the transit center.

Finally the **Downtown Transfer Point**, currently located on three sides of the Courthouse, will continue to be an important hub for the system. The diagonal grid pattern of downtown makes it easy to bring multiple lines together there, and this confluence of service can help to enhance the vitality of downtown, especially as frequencies improve.

As for **Manchester Transit Center**, it continues to be valuable in the short term, as an offstreet connection point between the north-south lines on Blackstone and Fresno Avenue and the services to CSU and the Tower District. (The Clinton line also deviates up to Manchester, though it is not clear that it needs to.) Manchester is very important to the short-term (2005) networks. However, as the system evolves toward more of a grid, the importance of this facility may decline.

3. Line Naming/Numbering

The proposed scenarios all differ from the existing system in that all lines that run downtown are numbered as though they are terminating there. This is not necessarily how the system would actually operate. In practice, a bus coming in on one line might run through downtown and out onto another. At this stage in planning, however, it is helpful to divide the lines at downtown, because it enables us to focus on the unique service needs of each corridor. Numbering each line separately on either side of downtown also allows each line to be identified with one, or at most two, major arterials, producing a simpler system. Most lines would be named for the arterial that it uses along most of its length, so that people become used to thinking of the service as part of the arterial.

At a later stage of planning and scheduling, lines ending downtown can be recombined in whatever way is most efficient, but the separate numbering is recommended to simplify the system. Separate numbering also makes it easier to recombine segments differently as demand warrants in the future.

The current scenarios follow Fresno's current practice of giving lines even numbers if they are mainly north-south, odd numbers if they are mainly east-west. This numbering echoes familiar patterns such as those of the U.S. and Interstate highway system numbering (though odd and even numbers play opposite roles there.) For familiarity, we follow Fresno's system. However, if and when major redesign is introduced, it may be appropriate to renumber the system with a few objectives:

- Reverse the roles of odd and even numbers, so that odd numbers denote north-south service, a pattern more familiar to people because it is used by the highway system.
- Number north-south lines in a range that does not overlap with east-west line numbers, so that as you leaf through the Bus Book, you see all the north-south lines in sequence, then all the east-west lines. For example, north-south lines, from west to east, might be numbered with the odd numbers from 5 to 25, while east-west lines, from south to north, might be numbered with even numbers from 30 to 49. Note that some room should be left on either end of these sequences in case new grid lines are eventually needed further out.
- Number all local feeder lines and routes – those that are not part of the main grid – in a range of higher numbers grouped geographically. We illustrate this feature in the service scenarios, using 50s for SW Fresno, 60s for SE Fresno feeders, and 70s for northside feeders. Note that while the 50s are numbered separately because they are short lines emanating from downtown, they are part of the grid in terms of their frequencies and the density of the area they serve.

Scenario A: Frequent Grid Service, Maximum Ridership

Scenario A is aimed solely at maximum productivity – that is, maximum ridership for the fixed budget. To do this, it deletes unproductive portions of the current system and focuses service on the area where ridership and densities are high. It also reduces specialized deviations in order to make the lines simpler, faster, and more attractive. Figure 7-1 presents the projected revenue hours, service frequencies and vehicle requirements. Figure 7-2 presents the system map.

The North-South Grid Corridors (West to East)

20 McKinley-Hughes and 22 McKinley-West – *Every 15 minutes!*

These two lines would remain half-hourly, but they would combine along a long common portion to provide much-needed 15-minute frequency between downtown and part of the Tower District. Departing downtown via Blackstone/Abby, they would run limited-stop (stopping only at Divisadero, Belmont, and Olive) to McKinley. Continuing together for 15-minute net headways, they would run west along McKinley past FCC and the north edge of the Tower District. Both would turn north on West Avenue to Shields, at which point the two lines would diverge. Line 20 would continue every half hour via Shields, Hughes, Emerson to the new Northwest Transit Center at San Jose & Brawley. Line 22 would continue straight north on West Avenue to end somewhere near Shaw, the end of its high-ridership segment.

26 Palm

This simple line is largely unchanged between downtown and North Riverpark Transit Center, with service every 30 minutes.

28 Tower District/CSU

Sometimes, a grid pattern must be violated because of a huge pattern of diagonal demand. This is the case with Line 28, which we propose to retain north of downtown with minimal adjustment. From downtown, the line would proceed north along the Tower District couplet to Shields, then turn east to serve Manchester Transit Center, then proceed east on Dakota. In a departure from the existing line, we propose turning north on Millwood instead of First. (Fashion Fair Shopping Center would be amply served by 15-minute service on Fresno and Shaw, as well as continued service along First.) Instead of proceeding to Clovis, Line 28 would terminate at CSU, looping near Bulldog stadium to serve concentrations of student housing as well as the University. Service to Clovis would be provided by Line 9 (see east-west lines below).

30 Blackstone – Every 15 minutes!

The backbone of the system, this line would be upgraded between downtown and North Riverpark Transit Center to operate every 15 minutes all day. Lower-ridership parts of this line would be replaced by other, less frequent services: Line 53 would serve the West Kearney area, while Line 34 would serve the employment centers north of Nees Avenue, which generate very little ridership on Line 30 despite the high service there.

32 Fresno Ave – Every 15 minutes!

This underserved corridor is lined with major medical destinations and employment centers, so we recommend upgrading it to 15-minute frequency. The line would be unchanged between downtown and North Riverpark Transit Center, retaining the deviation to Manchester Transit Center for the time being.

34 First

This line would exit downtown from the south, turning east on Ventura and north on First. It would then run the entire length of First past Nees Avenue where First becomes Audobon. From here, it would operate, if possible, through the River Park employment area, serving National University, before returning back south to end at North Riverpark Transit Center

While 15-minte service on this line is highly desirable (as it is on every grid line in the proposed system) it is not affordable within the constraints of this scenario.

38 Cedar/Jensen – *Every 15 minutes!*

Minimal change is proposed on this very, very successful line, except that frequencies are upgraded to every 15 minutes, dramatically improving crosstown access to CSU and also providing the first 15-minute headways in the southwest part of town. Because of the very high frequencies, and because people will walk further to better service, we recommend deleting the Hinton Park deviation, replacing it with convenient stops along Walnut Avenue. The line would enter downtown via a new Tulare Avenue alignment.

East of Cedar

South of the airport, the grid system continues east of Cedar, but the north-south portions are provided by L-shaped lines. For service on Palm, see Line 27. For service on Chestnut, see Line 41. Both are discussed in the section below.

The East-West Grid Corridors (South to North)

27 Butler

This line would retain existing 30-minute headways along Butler between downtown and Southeast Transit Center. From there, the line would proceed east along Lane Avenue to serve the IRS service center and Sunnyside high school. Finally, the line would turn north on Palm, functioning as a Palm crosstown up to its terminus at the airport. (For travel between the airport and downtown, this line would provide a reasonably direct trip.)

At the Airport, Line 27 buses would continue onto Line 39-Clinton, and vice-versa.

29 Ventura – Every 15 minutes!

This corridor would be upgraded to operate every 15 minutes all day along Ventura/Kings Canyon, from downtown to Clovis Avenue. From there, the service would turn north to terminate at a new East Riverpark Transit Center at Clovis and Belmont. Service would deviate as needed only to serve the Southeast Transit Center, whose exact location remains to be determined.

31 Tulare

This segment of an existing line would be retained, running directly between downtown and Clovis Avenue along Tulare. The line would end at the new East Riverpark Transit Center.

33 Belmont

The current Belmont crosstown service is weaker than it should be given the densities it serves. We recommend upgrading it in two ways. First, the west end would be extended from its current end at the zoo to continue into downtown, replacing a portion of Line 30 and also replacing the specialized service now provided by Line 18. From the zoo, the line would continue west on Belmont to Pacific, then turn south on Pacific which crosses the freeway and becomes Teilman, then turn east on Whites Bridge into the Whites Bridge-Amador couplet. The line would then turn north on Trinity, which becomes Eldorado, then southeast on G Street and northeast on Fresno St. into downtown. This routing eliminates a very awkward portion of the current Kearney portion of Line 30, and permits the Kearney area to be served more directly via proposed Line 53 (see below)

At the east end, Line 33-Belmont would be extended to cover the full length of Belmont out to Clovis Avenue, where it would end at the new East Riverpark Transit Center. While development is still spotty on this portion of Belmont (beyond Maple, where the line ends today), the construction of the SR 180 freeway plus the proposed River Park II Center will catalyze new development here. Having transit in place will help to support more transit-oriented development forms as these new homes and businesses are planned.

35 Olive

This line would be extended east to the East Riverpark Transit Center, for the same reasons outlined above. Currently, Olive is served by portions of two different lines. The new crosstown alignment will simplify this service and provide faster connections to major north-south lines all across the city.

In the Productivity scenario, the west end of this line is unchanged. In the Coverage scenario, the line is extended west, as discussed in that section below.

39 Clinton

We recommend extending the west end of the Clinton line to replace Line 9's service on the west side of the freeway. The Clinton line proceeding west would turn north on Brawley, west on Ashlan, north on Cornelia, west on Parkway/Fairmont, north on Polk and east on Shaw to end at the Northwest Transit Center. This extension is recommended so that the Shaw line can terminate at Northwest Transit Center coming from the east, which makes it easier to give Shaw the 15-minute service that it urgently needs.

At the Airport, Line 39 buses would continue onto Line 27, and vice versa.

The deviation into Manchester Transit Center is recommended for elimination, since all of the connections available here can be made at other points along the line.

41 Shields-Chestnut

This line would be largely unchanged, except at the southeast end. The northwest end would be anchored at the Northwest Transit Center. The southeast end would terminate at Southeast Transit Center near Butler, since this is the south end of the high-ridership area on Chestnut. In the Coverage scenario, the line continues south to Malaga, as discussed in that section below.

9 Shaw – Every 15 minutes!

This major east-west corridor has the potential to support 15-minute frequency all the way from Northwest Transit Center in the west to the Clovis transit hub in the east. We recommend that the line focus on this corridor.

Line 9 would replace Line 28 in serving central Clovis. At the west end, Line 9 would end at Northwest Transit Center (Brawley and San Jose). Service further west, including the long section west of the freeway, would be replaced by Line 39-Clinton, which would provide more direct access into more central parts of Fresno. Line 39 and Line 9 would connect at Northwest Transit Center for passengers wishing to travel east along Shaw.

If the present numbering system is retained, this line should eventually be renumbered 47, to reflect its position in the grid system.

The Southwest Corridors (50s)

Fresno's growth to the southwest has been minimal compared to its growth in other directions. As a result, the urbanized southwest of the city is a small area, generally requiring short lines. Even these lines can be streamlined for faster service, and in some case, higher frequencies.

One high-frequency service for the southwest is proposed above: Line 38-Cedar-Jensen would run across the southwest area on Jensen, then proceed into downtown via Tulare Avenue. The rest of the southwest can be served by relatively short lines emanating out of the downtown transit center. While the southwest lines are numbered separately for clarity, they could be recombined with other lines as appropriate.

51 Elm/52 ML King

We propose to simplify the Elm and ML King services by combining them into a two-way loop, though we recommend changing numbers at the end of the loop so that passengers can experience either side of the loop as a simple two-way line with the same number. Line 51-Elm and 52-ML King would both emanate from downtown and proceed along their respective streets to the southern end of the city, at North Avenue. Here, Line 51 buses would turn into Line 52, and vice versa. Depending on scheduling, the alternation of Line 51 and Line 52 could produce a net 15-minute headway between downtown and the outer parts of Elm or ML King, by alternating routes. Of course, 15-minute service on both lines alone would be justified, if it could be afforded.

53 Kearney

This small line would replace most of the Kearney loop now served by Line 30. This area's ridership does not make it a high priority for frequent service, so we propose a 30-minute headway for the time being. However, ridership may improve because the line is proposed to be straighter, no longer deviating to serve the City Corporation Yard.

From downtown, the line would follow the Stanislaus/Tuolomne couplet all the way to Trinity. From there, it would turn south on Trinity and terminate by looping clockwise via Trinity, California, West, Kearney back to Trinity. This line is carefully designed to cycle in 25 minutes out and back from downtown. While many variants are possible, they should preserve this total running time. The need to operate a more efficient cycle is the main reason to shift the focus of the service to cycle on busier arterials. (Kearney could be used for more of the line, were it not for the slow frontage road operation that it requires.)

Scenario B: Better Coverage, Lower Ridership

This scenario retains and expands the coverage of the system, pushing service into parts of Fresno that do not currently have service. It also retains service to virtually every place that has it now, regardless of ridership. To do this, though, this scenario must spread resources more thinly. It cannot provide the extensive 15-minute service proposed under Scenario A, while remaining within the 25% growth cap.

Still, this scenario retains many of the structural improvements proposed under Scenario A. It would increase system productivity and farebox return, though less than Scenario A would do. Figure 7-3 presents the projected revenue hours, service frequencies and vehicle requirements. Figure 7-4 presents the system map.

Frequency Changes to Scenario A Lines

All of the lines proposed in Scenario A are retained in Scenario B, but usually without the increases in frequency.

The only lines that would run every 15 minutes all day would be Line 30 on Blackstone and Line 9 on Shaw, forming a cross-shaped pattern of high-frequency serving the region's busiest transit destinations. All other lines would run every 30 minutes all day.

Extensions to Scenario A Line 35

In general, this scenario tries to provide coverage with lines that are designed solely for that purpose. In one case, hourly new coverage would be provided through hourly extensions of Productivity-oriented lines that exist in Scenario A.

Line 35-Olive would be extended northwestward to fill in some areas now served by Lines 9 and 39, and expand coverage to developing areas. From its terminus at Olive & Marks, Line 39 service would continue every 60 minutes via Marks and Shields, looping clockwise via Blythe, McKinley, Shields.

60 Malaga

This small-bus route,[2] running every 60 minutes, would replace Line 41 on its existing routing south of Butler, serving Malaga. This segment does not support service in a Productivity scenario, but it does have some ridership, and this extension would retain lifeline access to the area. The route would make convenient connections at the Southeast

[2] Service on 60 would be provided using a 18'-22' standard "cutaway" style small bus.

Transit Center to lines serving downtown, CSU, and other major destinations all over Fresno.

Flex Routes: An Overview

Flex Routes are services that have certain scheduled timepoints every hour, but can spend the rest of their time circulating in a designated area depending on what service is needed at the moment. Flex Routes provide coverage over a larger low-density area than a fixed route could do, but are slightly less convenient because passengers must call for service, unless their trip is originating at the transit center or another fixed timepoint.

A Flex Route area contains designated stops that are within 1/4 mile of every residence or destination in the area, street patterns permitting. When a customer calls for service, they are directed to the stop nearest them, and are told when the Flex Route bus will be there. The driver then plots a course that serves the requests, while also dropping off passengers who have boarded at the transit center.

Flex Routes are an ideal way to provide large amounts of coverage efficiently to the general public. They are entirely distinct from paratransit services, which are designed for the disabled and therefore do not presume the ability to walk to a bus stop.

Because they need to penetrate neighborhoods, Flex Routes are usually operated with small vehicles, such as 18-passenger minivans.

61 Southeast Flex

The Southeast Flex Route would be designed to cover the area generally east of Chestnut and south of Ventura/Kings Canyon, out to Clovis Blvd or slightly beyond if time permits. The route would make hourly connections with the many lines converging on Southeast Transit Center (Winery and Lane vicinity), and could also make connections on the half hour at East Riverpark Transit Center (Clovis and Belmont).

71 Northwest Flex

This large flex area covers most of the city north of Shaw Avenue and west of Palm Avenue, including the West Herndon corridor, an area that presents many obstacles to conventional fixed route service. Flex Route buses would connect on the hour at two points: Northwest Transit Center (Brawley and San Jose) in the west, and North Riverpark Transit Center (Blackstone and El Paseo) in the east. Flex Route buses would have an entire hour to get from one end of this area to the other, so they would have ample time to reach the many hard-to-serve destinations in northwest Fresno. Two Flex Route buses would provide this service, one heading generally eastward and the other generally westward during each hour.

72 Children's Hospital Shuttle

This hourly shuttle from North Riverpark would remain unchanged, except for its number. Because it requires less than 30 minutes to cycle, it would share a bus with Line 73.

73 St. Agnes Shuttle

This hourly shuttle would proceed east from North Riverpark along Herndon, serving the concentrations of medical and residential destinations as far east as Chestnut, using a figure-eight pattern. This routing is not ideal, but reflects the difficulty of threading the street pattern, and the danger of stopping on Herndon at many locations where there would be demand.

74 Northeast Flex

This hourly route would operate along a fixed route for part of its length, extending from North Riverpark Transit Center east on Alluvial, north on Millwood, east on Teague, and north on Cedar to Shepherd Road. This portion of the route is meant to cover a variety of apartment and commercial developments. At Cedar and Shepherd, the route would go into flex mode. During the rest of its hourly round trip it could go anywhere in the city limits north of Shephard *OR* east of Maple as far south as Alluvial. In essence, this coverage area is designed to provide access to everyone who is not within 1/2 mile of a fixed route, but within the city limits, in northeast Fresno, except for a sparsely developed and remote area around the Herndon interchange on SR 99.

Figure 7-1 FAX 2005 Productivity Scenario: Hours, Frequencies and Vehicles

			WEEKDAY (255 days)								WEEKDAY													WEEKEND						WEEKEND										ANNUAL		
			RND TRIP TIME excluding recovery				RND TRIP TIME including recovery				FREQUENCY				VEHICLES				HRS/WEEKDAY				WKDAY. REV HRS	RND TRIP TIME excluding recovery			RND TRIP TIME including recovery			FREQUENCY			VEHICLES			HRS/WKEND DAY			Wkend day REV HRS	Weekday Rev. Hours	Weekend Rev. Hours	Total Rev. Hours
Route	NAME: Terminals	Notes	Peak	Base	Eve	Nt	Peak	Base	Eve	Nt	Peak	Base	Eve	Nt	Peak	Base	Eve	Nt	Peak	Base	Eve	Nt		Peak	Base	Eve	Peak	Base	Eve	Peak	Base	Eve	Peak	Base	Eve	Peak	Base	Eve				
NORTH-SOUTH CORRIDORS (EVEN NUMBERS UNDER 50)																																										
	MCKINLEY/HUGHES: Downtown-NWTC	to 22		90				99				30			0	3.50	0	0		16.5			58		90		0	99	0		30		0	3.50	0		12.0		42	14,741	4,452	19,193
22	MCKINLEY/WEST AV: Downtown-West/Shaw	to 20		60				66				30			0	2.20	0	0		16.5			36		60		0	66	0		30		0	2.50	0		12.0		30	9,266	3,180	12,446
26	PALM: Downtown - Riverpark	to 34		90	81			99	89			30	30		0	3.50	3	0		14.0	2.0		55		90	81	0	99	89		30	30	0	3.40	3		12.0		41	14,039	4,325	18,364
28	TOWER DIST: Downtown - CSU	to 31		90				99				30			0	3.50	0	0		16.5			58		90		0	99	0		30		0	3.50	0		12.0		42	14,741	4,452	19,193
30	BLACKSTONE: Downtown to Riverpark			*81*				89				15			0	6	0	0		15.0			90		81		0	89	0		15		0	6	0		12.0		72	22,973	7,632	30,605
32	FRESNO: Downtown - Riverpark			100				110				15			0	8	0	0		14.0			112		100		0	110	0		30		0	4	0		12.0		48	28,588	5,088	33,676
34	FIRST: Downtown-Riverpark	to 26		100				110				30			0	3.80	0	0		15.0			57		100		0	110	0		30		0	3.80	0		12.0		46	14,549	4,834	19,383
38	CEDAR: Riverpark - Downtown			160				176				15			0	12	0	0		15.0			180		160		0	176	0		30		0	6	0		12.0		72	45,945	7,632	53,577
EAST-WEST CORRIDORS (ODD NUMBERS UNDER 50)																																										
9	SHAW: Clovis - NWTC			76				84				15			0	6	0	0		16.5			99		76		0	84	0		15		0	6	0		12.0		72	25,270	7,632	32,902
27/39	27-BUTLER, 39-CLINTON			190				209				30			0	7	0	0		15.0			105		190		0	209	0		30		0	7	0		12.0		84	26,801	8,904	35,705
29	VENTURA: Downtown-Clovis/Belmont			67				74				15				5				16.5			83		67		0	74	0		15		0	5	0		12.0		60	21,058	6,360	27,418
31	TULARE: Downtown - Clovis/Belmont	to 28		60				66				30			0	2.50	0	0		16.0			40		60		0	66	0		30		0	2.50	0		12.0		30	10,210	3,180	13,390
33/35	33-OLIVE, 35-BELMONT			*135*				149				30			0	5	0	0		15.0			75		135		0	149	0		30		0	5	0		12.0		60	19,144	6,360	25,504
41	SHIELDS. NWTC - SETC			140				150				30			0	5	0	0		15.5			78		140		0	150	0		50		0	3	0		11.0		33	19,782	3,498	23,280
LOCAL AREA CORRIDORS																																										
51-52	Downtown/MLK/Elm			80				88				30			0	3	0	0		15.5			47		80		0	88	0		30		0	3	0		12.0		36	11,869	3,816	15,685
53	KEARNY loop			25				28				30			0	1	0	0		14.5			15		25		0	28	0		30		0	1	0		12.0		12	3,701	1,272	4,973

Peak Bus Requirement	0
Base Bus Requirement	77
Evening Bus Requirement	3
Weekday Rev. Hours	1,186
Year	302,379
Wkend Day Rev Hrs	779
Year	40,529
ANNUAL	**385292**
Growth from Existing:	**24%**

Figure 7-2 FAX 2005 Productivity Scenario System Map

[insert from graphics]

Figure 7-3 FAX 2005 Coverage-Emphasis Scenario: Hours, Frequencies and Vehicles

			WEEKDAY (255 days)								WEEKDAY													WEEKEND						WEEKEND										ANNUAL		
			RND TRIP TIME excluding recovery				RND TRIP TIME including recovery				FREQUENCY				VEHICLES				HRS/WEEKDAY				WKDAY. REV HRS	RND TRIP TIME excluding recovery			RND TRIP TIME including recovery			FREQUENCY			VEHICLES			HRS/WKEND DAY			Wkend day REV HRS	Weekday Rev. Hours	Weekend Rev. Hours	Total Calc. Rev. Hours
Route	NAME: Terminals	Notes	Peak	Base	Eve	Nt	Peak	Base	Eve	Nt	Peak	Base	Eve	Nt	Peak	Base	Eve	Nt	Peak	Base	Eve	Nt		Peak	Base	Eve	Peak	Base	Eve	Peak	Base	Eve	Peak	Base	Eve	Peak	Base	Eve				
NORTH-SOUTH CORRIDORS (EVEN NUMBERS UNDER 50)																																										
20	MCKINLEY/HUGHES: Downtown-NWTC	to 22		90				99				30			0	3.50	0	0		16.5			58		90		0	99	0		30		0	3.50	0		12.0		42	14,741	4,452	19,193
22	MCKINLEY/WEST AV: Downtown-NWTC	to 20		60				66				30			0	2.20	0	0		16.5			36		60		0	66	0		30		0	2.20	0		12.0		26	9,266	2,798	12,064
26	PALM: Downtown - Riverpark	to 34		90	81			99	89			30	30		0	3.50	3	0		14.0	2.0		55		90	81	0	99	89		30	30	0	3.50	3		12.0		42	14,039	4,452	18,491
28	TOWER DIST: Downtown - CSU	to 31		90				99				30			0	3.50	0	0		16.5			58		90		0	99	0		30		0	3.50	0		12.0		42	14,741	4,452	19,193
30	BLACKSTONE: Downtown to Riverpark			81				89				15			0	6	0	0		15.0			90		81		0	89	0		15		0	6	0		12.0		72	22,973	7,632	30,605
32	FRESNO: Downtown - Riverpark			100				110				30			0	4	0	0		14.0			56		100		0	110	0		30		0	4	0		12.0		48	14,294	5,088	19,382
34	FIRST: Downtown-Riverpark	to 26		100				110				30			0	3.80	0	0		15.0			57		100		0	110	0		30		0	3.80	0		12.0		46	14,549	4,834	19,383
38	CEDAR: Riverpark - Downtown			160				176				30			0	6	0	0		15.0			90		160		0	176	0		30		0	6	0		12.0		72	22,973	7,632	30,605
EAST-WEST CORRIDORS (ODD NUMBERS UNDER 50)																																										
9	SHAW: Clovis - Brawley			75				83				15			0	6	0	0		16.5			99		75		0	83	0		15		0	6	0		12.0		72	25,270	7,632	32,902
27/39	CLINTON/BUTLER			190				209				30			0	7	0	0		15.0			105		190		0	209	0		30		0	7	0		12.0		84	26,801	8,904	35,705
29	VENTURA: Downtown-Clovis/Belmont			67				74				30				3				16.5			50		67		0	74	0		30		0	3	0		12.0		36	12,635	3,816	16,451
31	TULARE: Downtown - Clovis/Belmont	to 28		60				66				30			0	2.50	0	0		16.0			40		60		0	66	0		30		0	2.50	0		12.0		30	10,210	3,180	13,390
33/35	33-OLIVE, 35-BELMONT			*135*				149				30			0	5	0	0		15.0			75		135		0	149	0		30		0	5	0		12.0		60	19,144	6,360	25,504
33/35	*35 west extension*			*50*				*55*				*60*			*0*	*1*	*0*	*0*		*15.0*			*15*		*50*		*0*	*55*	*0*		*60*		*0*	*1*	*0*		*12.0*		*12*	*3,829*	*1,272*	*5,101*
41	SHIELDS. NWTC - SETC			140				150				30			0	5	0	0		15.5			78		140		0	150	0		30		0	5	0		11.0		55	19,782	5,830	25,612
45	*ASHLAN: NWTC-Fowler/Shields*			*109*				*120*				*60*			*0*	*2*	*0*	*0*		*15.0*			*30*		*109*		*0*	*120*	*0*		*60*		*0*	*2*	*0*		*12.0*		*24*	*7,658*	*2,544*	*10,202*
LOCAL AREA CORRIDORS																																										
51-52	Downtown/MLK/Elm			80				88				30			0	3	0	0		15.5			47		80		0	88	0		30		0	3	0		12.0		36	11,869	3,816	15,685
53	KEARNY loop			25				28				30			0	1	0	0		14.5			15		25		0	28	0		30		0	1	0		12.0		12	3,701	1,272	4,973
60	*S CHESTNUT: SETC-Malaga*			*50*				*55*				*60*			*0*	*1*	*0*	*0*		*15.0*			*15*		*50*		*0*	*55*	*0*		*60*		*0*	*1*	*0*		*12.0*		*12*	*3,829*	*1,272*	*5,101*
61	*SE DAR*			*50*				*55*				*60*			*0*	*1*	*0*	*0*		*15.0*			*15*		*50*		*0*	*55*	*0*		*60*		*0*	*1*	*0*		*12.0*		*12*	*3,829*	*1,272*	*5,101*
71	*WEST HERNDON Deviated. Riverpark-NWTC*			*105*				*116*				*60*			*0*	*2*	*0*	*0*		*15.0*			*30*		*105*		*0*	*116*	*0*		*60*		*0*	*2*	*0*		*12.0*		*24*	*7,658*	*2,544*	*10,202*
72/73	*72-Childrens Hosp, 73-St, Agnes*			*50*				*55*				*60*			*0*	*1*	*0*	*0*		*15.0*			*15*		*50*		*0*	*55*	*0*		*60*		*0*	*1*	*0*		*12.0*		*12*	*3,829*	*1,272*	*5,101*
74	*North DAR*			*50*				*55*				*60*			*0*	*1*	*0*	*0*		*15.0*			*15*		*50*		*0*	*55*	*0*		*60*		*0*	*1*	*0*		*12.0*		*12*	*3,829*	*1,272*	*5,101*

Peak Bus Requirement	0
Base Bus Requirement	74
Evening Bus Requirement	3

Wkday Rev. Hours	1,142
Year	291,159

Wkend Day Rev Hrs	883
Year	45,916

ANNUAL	**385042**
Growth from Existing:	**24%**

Figure 7-4 FAX 2005 Coverage-Emphasis Scenario System Map

[insert graphics]

Chapter 8. Long Term Plans

ASSUMPTIONS

It is hard to see 20 years into the future, but several things seem likely:

1. Fresno, and Clovis, will continue to grow.
2. This growth will remain within the city's Sphere of Influence, and will be guided by the 2025 General Plan. N\N assumes a linear path toward buildout of the 2025 General Plan, which means that about 4/5 of the new growth would be in place by 2020. Actual growth rates will of course be faster or slower depending on the economy.
3. Based on the General Plan, existing areas that are served by the proposed grid system of Scenario A will either remain as they are or grow more dense. Transit demand in all these corridors will therefore increase.
4. Based on the General Plan, new areas of growth, noted as "Areas of Intere reach densities high enough to support an extension of a high-frequency grid system into these areas.
5. Growth elsewhere in the San Joaquin Valley will occur based partly on the growth of Fresno as an employment center. Already, nearby cities such as Sanger and Madera are becoming "bedroom communities" for Fresno.
6. Funding sources will grow in proportion to population. Since transit demand tends to grow faster than population in densifying urban areas, the city will be under pressure to establish increased local funding for transit. Fare increases will also be necessary, at least with inflation, but these will not cover the rising cost of operations.
7. Judging from similar trends all over urban America, the desire for more livable communities will lead both to more pedestrian-friendly new development, and to revitalization of attractive inner-city areas such as downtown and the Tower District.

These predictions can be made with some confidence even though, at this time, the future of the economy is highly uncertain. Even if the world enters another period of recession comparable to 1991-2, this recession will eventually end, and we can expect that over the 20-year period considered here, significant net growth will still occur.

Figure 8-1 Long Term Areas of Interest

[insert from graphics]

One major area of uncertainty is the possible development of CalSpeed, a European-style high-speed rail system linking Northern and Southern California. Will it be developed? Will it serve downtown Fresno? If such a system is developed, Fresno is likely to grow faster than currently predicted, and with a greater focus on downtown. An effective plan, then, must ensure that downtown remains a focal point for the city, so that the plan can be built upon, rather than scrapped, if high-speed rail brings on more intensive growth.

As Fresno grows, so will the demand for transportation within the city. Overall travel demand, by all modes, will grow by 30%.[1]

The key questions for 2020 are: **How many of these new trips will be in single-occupant automobiles, as opposed to other modes such as transit? And who will the transit riders of 2020 be?**

This section identifies several possible strategies that the region could follow in accommodating the growth of travel demand. Each offers a different answer to the questions noted above. They are presented in order of the level of effort cost involved.

1. Implement 2005 Service Plan (Scenario A or B), then grow service only as current funding sources permit. This approach presumes that the 30% growth in travel will occur overwhelmingly in the form of single-occupant auto trips.
2. Aggressively seek funding for a major expansion and "reinvention" of the rubber-tired transit system. While some Fresno residents may not be willing to ride anything that looks remotely like a bus, these improvements would dramatically increase ridership among lower and middle-income groups, and provide service that would appeal to at least some riders who have the choice of driving.
3. Aggressively seek funding for major fixed guideway transit projects, such as monorail or light rail. If successful, this strategy could produce a major shift toward transit and away from the auto, and would tend to attract riders from across the socioeconomic spectrum.

1. "Steady-State" Scenario

By 2005, even short term Scenario B would increase systemwide productivity from the current 43 boardings per revenue hour to at least 50. If transit maintains its current share of all tripmaking in the region, and tripmaking grows at a linear pace between now and 2020, ridership by 2020 would exceed 60 boardings per hour if no new service is added. In other words, on average one passenger would board per minute of operations.

[1] Source: COFCG Travel Demand Model

Based on this line of thinking, new service would have to be added, for two reasons:

1. A systemwide <u>average</u> of 60 boardings per hour would almost certainly mean overloading and pass-ups, because during peak periods, or in peak directions, demand would be much heavier than the "average." The City would be forced to add service just to accommodate its peak loads. Deploying articulated buses would stave off this problem to some extent, but not completely.
2. The growth in regional tripmaking will fall most heavily on the major arterials, which as a result will experience slower speeds. The growth in congestion will slow down the bus system as well, requiring that 1-2% per year in service be added to the system to provide additional running time to help sustain on-time performance. (Already, drivers observe that many routes do not have enough time in current traffic conditions. A short-term study of this problem is in order.)
3. New growth areas, identified in Figure 8-1, will demand expansions of the route network.

If resources grow only with the current sales tax base, it will be difficult if not impossible to do all of these things. No other improvements would be possible anywhere in the system. In some systems, the decline in operating speeds alone is consuming most of the available growth in resources.

2. Aggressive "Reinvented Bus" Scenario

Everyone is looking for "advanced" or "innovative" forms of transportation. This includes both demand-responsive services (recommended in Scenario B) and also new forms of high-capacity transit such as monorails. These technologies are discussed under the rail scenario below.

The bus as we know it, is changing rapidly and will barely be recognizable 20 years from now. Many of the features that people dislike about buses are gradually being eliminated. When visualizing the bus of 2020, the following can reasonably be assumed:

<u>Electric Drive</u>

Electric or some form of hybrid-electric technology will become standard. The most likely form of hybrid-electric uses a diesel engine to power an electric drivetrain and charge electric batteries. Acceleration from a stop is done solely on the resulting electric power. (A more advanced but speculative technology, the fuel cell, dispenses with the diesel engine entirely.) A demonstrator diesel-electric bus is already in service in Fresno. These buses significantly reduce the:

- noise a bus currently makes when accelerating or decelerating
- exhaust that a bus emits when accelerating from a stop.

- pollution from operations to a point that far exceeds the requirement of current clean air legislation.

These buses can accelerate as smoothly as a rail vehicle.

<u>Low Floor</u>

Low-floor designs eliminate wheelchair lifts and speed boarding and alighting for all passengers. While these buses were not popular with seniors during a recent test in Fresno, the huge time-savings that they achieve are likely to make them standard in the industry. The City's preliminary decision not to buy them should be reviewed in light of their full range of benefits, especially since demand for them is so high that high-floor bus options are likely to dwindle rapidly.

<u>Rear Window</u>

Bus manufacturers are beginning to restore the rear window, which was once a normal feature but has been missing from buses for the last generation. The rear window will ensure greater visibility into the vehicle from all sides, increasing the sense of security.

<u>Automatic Announcements</u>

Automated announcements and electronic displays within the bus will call out stops and possible connections, and could even tell the passenger the wait time for the next bus on each intersecting line.

Low floor, diesel-electric buses currently cost about $400,000, compared to $300,000 for a standard diesel coach. This technology is under rapid development, and this gap is likely to close within the next few years to the point that diesel-electrics will become cost-competitive with standard diesels.

In short, the bus of 20 years from now will be much like a light rail vehicle on tires. *Many communities that are currently considering light rail may find that these vehicles will offer much of what people demand of transit but do not find in the bus of today.*

But of course, "reinventing the bus" requires more than buying new buses. On the planning side, it means:

- Protecting reliability and operating speed from rising congestion. A wide range of signal priority, lane treatment, and other tools are available for this purpose, many of them largely unnoticeable to the motorist. In some cases, where very high frequency service is desired, an exclusive lane for transit may be appropriate.
- Operating a grid network with very high frequencies – no worse than every 15 minutes all day, but more frequently on the busiest lines at the busiest times of day. Achieving this service level on the entire grid identified in Scenario A, plus

the expansion areas noted in Figure 8-1, would approximately triple the size of the system, to about 1 million annual revenue hours and a total fleet of about 200 buses, including spares.

- "Branding" the high-frequency network with a distinctive look and feel that represents a commitment to the customer regarding minimum frequencies, reliability, and other features of service quality.
- Establishing policies that ensure that land uses and street design around the high-frequency network both support the goal of increased ridership. These policies are discussed in a separate section below.

Finally, amenities on the ground need to match those on the bus. Street furniture should be designed to a much higher architectural standard, with features that attract the passenger visually, and give value to the passenger's time. This means:

- Installing shelters that protect waiting passengers from traffic, typically with a transparent shield between passengers and the street.
- Creating distinctive designs and signage that make the facility recognizable from afar.
- Installing real-time information displays. This rapidly-developing technology provides an electronic display of when the next bus is actually coming, based on data from the Automatic Vehicle Locaton system about where the bus currently is. Samples of these can already be viewed along Line 22-Fillmore in San Francisco. These would be deployed at least at transfer points. Each shelter costs $20,000 (also a cost that will come down over time) and about 100 would be needed at the ultimate buildout of a bus-based system.
- Using selected capital improvements to give the bus network a sense of "permanence." Developers will be more likely to build near bus lines if they have some assurance that the system will be "here tomorrow."

The costs for buildout of a bus-based system would be no more than $100 million, far lower than any of the rail options discussed below. This assumes costs in the range of $2 million for 100 advanced shelters and another $15 million in facility expansions. The cost of advanced low-floor buses, 200 at $400,000 each, is $80 million if bought all at once, but in fact these would be phased in, and the burden on local funding sources would be smaller than for any rail scenario. Federal financing for bus purchases is much more generous than for new rail starts.

3. Rail Scenario

This scenario envisions that expanded funding would be sought primarily to build and operate some form of rail transit system. For the purposes of this discussion, we focus on light rail and monorail as the most likely forms of rail transit. Light rail is currently the most common form of rail transit in America outside of the biggest cities. Monorail represents a range of technologies that, until recently, have been largely confined to amusement parks, airports, and other specialized short-distance uses.

What Are the Options?

Two types of rail transit are widely discussed for application in the Fresno area:

Light Rail

Light rail is a well-established technology that consists of small trains, usually 1-2 cars, operating on standard-guage rails using an electric power source from overhead. Light rail is popular in the U.S. partly because of its flexibility: it can cross traffic at grade and can run along arterials and existing rail rights-of-way. It can also go into elevated or underground segments, though these are far more expensive to build than at-grade segments. Light rail can even share a lane with traffic, as it does in downtown Sacramento, though it sacrifices much of its reliability by doing so. Two all-surface light rail systems that would be good models for Fresno are San Jose and Sacramento.

Monorail

Monorail is an intriguing technology that has been implemented in many small-scale settings, such as one-way loops or two-station shuttles, but is only now being promoted for long transit corridors in the US. As the name implies, monorails are electric vehicles that cling to a single rail, typically attached to a narrow concrete structure. The vehicle may hang below the structure, or, as in most current examples, rest on top of it while reaching down on one side of it.

Two major linear monorail projects are currently in early planning stages. In Las Vegas, a project on the Las Vegas Strip would extend the small privately-funded monorail linking two hotels into a line running all the way from downtown Las Vegas to Tropicana Avenue near the southern end of the strip. Seattle is considering a starter monorail project on its west side.

There's no question that monorails are "fun to ride" and people like them; however, they do have two significant disadvantages. They require continuous aerial structure, which is 1) more expensive and 2) more visually intrusive in the streetscape than transit on the surface. Like the skywalk systems of many snowbelt cities, monorails promote second-storey nodal development but do not support street-level retail. In fact, the elevated structure of a two-way monorail can make for an unpleasant pedestrian environment if it runs down too narrow a street, as a walk under Seattle's existing monorail on Fifth Avenue will demonstrate. They are more appropriate when placed down the middle of huge arterials such as Blackstone and Shaw, where their shadows are less obtrusive. However, this approach requires more expensive stations.

Where Do We Build It?

Based solely on demand (without considering availability of right-of-way), the following corridors would be the most likely candidates for some type of rail transit service. These corridors reflect the fact that most rail transit requires a continuous or nodal pattern of density and a long enough corridor that its travel time advantage is worthwhile to the customer. These corridors reflect the densities existing or projected in the General Plan. Changes to that plan could of course raise or lower the prospects for each corridor, and could create new ones. The corridors are listed in approximate order of likely demand.

1. Downtown to Blackstone & Nees via some mixture of Blackstone and SR 41, possibly approaching downtown via the Tower District.
2. A branch of the Downtown to Blackstone Line, traveling east on Shaw to CSU Fresno and perhaps Clovis.
3. West Shaw from Blackstone to a new Regional shopping center at Shaw & Grantland (see General Plan).
4. East Ventura/Kings Canyon to Chestnut, or eventually to Clovis Ave.
5. Herndon Avenue east from Blackstone to Chestnut. (Unlikely as LRT, conceivable as monorail)
6. Herndon Avenue west from Blackstone to Palm. (Unlikely as LRT, conceivable as monorail)

Finally, if rail freight is successfully removed from the Burlington Northern Santa Fe (BNSF) railway that cuts through the northwest part of the city, this could provide a relatively inexpensive rail transit corridor between downtown and a new terminus and major Park and Ride near West Herndon. This line would run through several areas of high density, including the rapidly developing Fig Garden area. *While residents along this corridor understandably want to be rid of the noise and vibrations of trains, the impacts of rail transit would be minor when compared to the current impacts of major freight.*

What does it cost?

Unfortunately, the costs of any rail transit system that can serve a large part of the city are substantial.

Monorail construction costs are claimed by some sources to be as low as $10 million/mile, though it is not always clear if this is for two-way lines. (Many existing monorails are short one-way loops.) We recommend monitoring the progress of the Las Vegas Strip monorail in order to obtain a more realistic understanding of costs. Started as a very short line connecting two casinos, it is now slated for a major expansion costing about $65 million/mile.[2] However, even this estimate may not be realistic. Recent conversations between N\N and Clark County Nevada RTC Staff have revealed that the actual cost to extend the line to downtown is likely to be closer to $110 million per mile.[3]

Light rail construction costs are much less speculative, because there is extensive experience from current and recent projects. The table below shows the costs of several projects now underway in comparable cities. All of these lines are entirely surface (not elevated or underground) and all are primarily in public right of way (either taking lanes of arterials or using existing railroad rights of way that have been deeded to the public.) As the table shows, costs range from $19 million to $60 million per mile. The difference is largely in the level of amenity and environmental impact mitigation in the different projects.

Figure 8-2 Some Current All-Surface Light Rail Projects[4]

City	Project	Length (mi)	Stations	Cost	Cost per Mile of Line	
Sacramento	South	11.2	7	$222 million	$20	million
Sacramento	Folsom	10.9	9	$209 million	$19	million
Portland	Interstate	5.8	10	$350 million	$60	million
San Jose	Capitol	3.3	4	$111 million	$34	million
San Jose	Tasman East	4.8	7	$270 million	$56	million
San Jose	Vasona	6.8	10	$342 million	$50	million
Houston	Starter	7.5	16	$300 million	$40	million

The two cheapest corridors on this list, the Sacramento projects, follow existing rail rights of way. For Fresno, only the northwest BNSF project might be built so cheaply, and only if the project used the existing rails, as the starter line of the San Diego Trolley did.

Setting the Sacramento examples aside, the cheapest project on this list is the Capitol corridor in San Jose, which follows the median of a large arterial that is already in public ownership. Setting aside for a moment the BNSF corridor, this is likely to be the cheapest form of light rail that is viable in Fresno. If we apply this cost to one line of the conceptual Fresno network outlined above – the line from downtown to Blackstone & Nees, the capital cost is $272 million. For a reasonably extensive system that reached most of the dense linear corridors of the city, such as the complete system outlined above, the capital cost tops $1 billion.

For monorail, the Las Vegas cost of $65 million/mile happens to be exactly twice the cheapest light rail figure, so one can easily double the estimates above: $544 million for

[2] All monorail costs are provided from a website maintained by monorail advocates at http://www.monorails.org/tMspages/HowMuch.html
[3] Source: Phone conversations with RTC staff, August 2001.
[4] All information taken from the website for each agency.

the first line and over $2 billion for the entire system. If we use the costs provided by RTC during recent phone conversations, then we can assume the cost would double again. Again, monorail costs are highly speculative, but the elevated construction required by monorail is inevitably higher than the surface construction of light rail. We use the Las Vegas cost because the Las Vegas project is a two-way service intended as linear rapid transit (not just for recreation, as the Seattle or Disneyland monorails are) and it operates in the U.S. regulatory environment.

It is possible that monorail could be cheaper than $65 million/mile, depending on the details of design. As its Fresno advocates have pointed out, monorail works best when it is jointly developed with buildings that it can serve directly on their second floors.

How Do We Pay For It?

Federal support for rail transit projects is much less generous than it was during the 1980s and 1990s, when light rail development in the U.S. reached its peak. Many of the major light rail systems in U.S. cities were built during a period when the Federal Transit Administration covered up to 80% of the costs, requiring only 20% to be raised locally. Today, most Federal funding for rail transit requires a 50% local match. Even in this case the competition for Federal funds is fierce, and a rail transit project must show ridership benefits that would make it competitive with projects underway in larger urban areas of California.

Optimistically, Fresno should expect to raise locally 50% of the costs of major capital projects such as the ones outlined above.

Would the rail systems pay for themselves in ridership? In the case of light rail, fares do not pay for their operations, let alone for their construction; in this aspect light rail is no different from bus service.

Monorail is largely untested as a linear service. The monorail now being contemplated for Seattle's westside is still too conceptual to cost, but its developing authority, the Elevated Transportation Company (www.elevated.org) presumes that extensive public financing will be required.

Monorails are often developed in a circulator mode, such as a one-way loop. Similar to "people-movers" in Detroit and Miami, or the operations that exist within many airports and amusement parks, these services are quite different from the long, linear corridors that would be needed to unite a city whose destinations are widely scattered, as they are in Fresno. Such facilities are sometimes justified by downtown redevelopment considerations, but as both Detroit and Miami demonstrate, the result is often a "fortress downtown" that still must be accessed mainly by car; the economic often benefits do not extend to the rest of the city. Such a downtown circulator might also be difficult to justify in Fresno because the most severe congestion problems are not downtown, but are further north on overburdened arterials such as Blackstone, Shaw, and Herndon.

Even small-loop monorails often do not support themselves despite significant ridership, or they must charge very high fares to do so. The privately-built monorail that circulates in the Manhattan-like densities of central Sydney charges a fare of AUD$3.50 (about US$2.50) to travel a one-way loop barely a mile long. Prior to the 2000 Olympics, it was barely breaking even. The monorails of Seattle Center and Disneyland were conceived as part of their respective attractions and were never intended to support themselves or pay for their own construction.

Of course, all of these considerations must be hedged by the fact that technology is developing rapidly. Monorail construction costs may come down, and may attract more private financing. Driverless monorails similar to the "People Mover" being developed at San Francisco International Airport, have some potential to reduce operating costs substantially, though operating costs would still be high.

Light rail costs continue to drift slowly upward, though this is partly because many cities have completed their cheapest projects and are now moving on to more difficult and expensive ones involving tunnels, elevated segments, etc. Light rail costs are considerably more certain, since there is plenty of industry experience to go on.

In any case, any rail transit in the Fresno area will require a huge public investment, with construction funding approaching $500 million, even for a basic citywide light rail. In addition, no rail transit system can succeed without a strong supporting bus system.

Choosing a Future

These scenarios lay out some of the tradeoffs of what are really two independent questions:

- Should new local funding sources be sought to dramatically improve the transit system, not just in quantity but in its attractiveness to the community? A "no" to this question means an acceptance of 30% growth in vehicular traffic over the next 20 years, and greater obstacles to enhancing inner city areas such as downtown and the Tower District. It also means accepting that the transit system will fail to keep up with demand as the region grows.
- If new funding is approved, should the focus be primarily on reinventing the bus service, or on more expensive projects such as light rail or monorail?

Both of these are political decisions that will be made based on many factors beyond those covered in this report. Our only technical conclusion is as follows:

> Based on currently known technology and costs, the most cost-effective transit system of the future would be a dramatically expanded one focusing on the high-density area of the city (roughly the area of Scenario A, expanded into the areas noted in the figure at the beginning of this chapter), along with the "reinvention of the bus" options outlined above.

Chapter 9. Policy Recommendations Integrating Transit, Land Use, and Street Operations

Regardless of whether Fresno moves toward rail in the future, the next decade or so is likely to be a period of increasing demand in the bus system. This chapter provides a set of policy recommendations designed to ensure that the City receives the maximum possible benefit from its transit investment, consistent with other city goals.

Primary Transit Network: Definition

The proposed service changes create a substantial network of services that run every 15 minutes or better all day. We recommend referring to these lines collectively as the "Primary Transit Network" or PTN. Although the PTN works together with other services, it differs profoundly from the rest of the system in two several key respects:

- **Ridership and Productivity Potential –** The 15-minute headway represents the point at which you no longer need to consult a schedule to use the service. It also permits transfers to be made rapidly even without timing of connections. For these reasons, these lines have the greatest ridership potential.
- **Magnified Effect of Small Changes –** On the PTN, the agency makes its most concentrated investment. Because of this, any changes that affect transit operations or attractiveness will be magnified. An amenity – such as a shelter – placed on the PTN will probably be used by more people, and will therefore have a greater positive impact, than the same shelter placed elsewhere. On the other hand, a delay imposed on a PTN line will cost the City more, in terms of both running time and ridership, than the same delay imposed on a less frequent service.
- **Potential Synergy with Land Use –** The level of service offered by the Primary Transit Network makes it possible, even convenient, to live without a car, or to have fewer cars than adults in a household, or for a business to require fewer parking spaces. The PTN is also the most cost-effective place to site any new transit-dependent development, in terms of transit costs, because a high level of service is already there. In general, the PTN requires density to support the high level of service, and it also provides the opportunity for further densification.

This section explores four areas of policy that apply particularly to the Primary Transit Network, though many are also relevant to less frequent lines:

1. Protecting the PTN's Speed and Reliability
2. Marketing the PTN for Maximizing Ridership
3. Enhancing Ridership through Land Use Synergies
4. Expanding the PTN in Concert with Development

Protecting Speed and Reliability

Most transit systems in growing communities are gradually slowing down. Many agencies lose one percent or more per year in average operating speed, due to a combination of rising patronage (which increases boarding times) and increased traffic congestion.

Traditionally, major transit agencies have set aside a portion of their expansion resources for "headway maintenance," which means adding buses to a line so that it has more time to complete its cycle. This may be the only solution to a running time problem in the short term, but it does nothing to arrest the downward slide in operating speeds. Instead, the transit agency simply pays more drivers to endure ever-increasing delays, and tolerates the gradual deterioration in the speed of the service.

When talking about transit speed, we are referring to travel time. The buses do not have to travel at faster speeds. The system must eliminate as much delay as possible.

Transit operating speed is a crucial consideration for two reasons. First, time is money; the longer it takes to complete the cycle of a line, the more it will cost to operate a given frequency. Second, the discretionary transit rider is very sensitive to speed. Because transit must stop to pick up passengers, it will usually be slower than cars driving on the same street. If it is too much slower, it will lose passengers to the automobile.

For these reasons, every major transit agency needs a comprehensive speed-protection strategy. The goal of such a strategy should be to set and maintain an average service speed policy on every line even as congestion, ridership, and other factors increase. The policy speed, of course, would vary with the line, but the slowest services – urban locals – are also the most crowded, so even the loss of 1 mph in speed can have cost and ridership impacts. Ultimately, the policy speed should be included in the street classification system, so that a deficiency in transit speed becomes visible as a problem just as deteriorations in traffic Level of Service do.

Stop Spacing

On many major lines, stops are very close together. An ideal stop spacing is close enough that everyone in the surrounding area can walk to a bus stop, but no closer. Two blocks, typically about 600 feet, is a common spacing standard in the. However, the maximum tolerable spacing for local lines can be up to 1/4 mile, or 1320 feet, if the stops are of very high quality such as the shelters proposed here. This means, in effect, a stop at each of the half-mile arterials, and one stop halfway between them.

Maximum stop spacing encourages passengers to gather in larger numbers at fewer stops. A bus stopping for two able-bodied passengers takes very little longer than stopping for one, so fewer stops with more passengers mean a faster operation for everyone.

Rear Door Alighting

Many transit agencies include in their rider education materials and onboard signs the simple message: "Please exit out the rear door, so people can board through the front." Seniors and disabled persons are often unwilling or unable to use the rear door, but many able bodied people exit out the front without thinking. The typical result is that the rear door, which can be used only for alighting, is idle even as passengers are still boarding at the front. This lengthens the dwell time at the stop unnecessarily.

Of course, rear-door alighting is only relevant on busy lines and at busy stops. It would be absurd to prohibit front-door alighting systemwide, because if nobody is boarding at the stop then rear-door alighting saves no time. However, a more aggressive campaign encouraging rear-door alighting, including an announcement from the driver when approaching a stop where people are waiting to board, can make a difference in the dwell time of busy lines. As with any other attempt to affect passenger behavior, the messages about rear-door alighting should clearly explain why Fresno asks its passengers to exit out the rear, rather than simply stating it as a rule.

Protections from Traffic Delay

A wide variety of tools are available to protect transit from traffic delay. The following tools are the most common, listed in order from lowest cost and benefit to highest cost and benefit: Cost in this case is not necessarily money; often, the cost takes the form of a negative impact on single-occupant traffic that must be tolerated to optimize transit speed.

- **Tools to eliminate merging delay from stops –** Transit often loses significant time yielding to traffic as it exits bus zones. For this reason, many agencies discourage bus pullouts, preferring bulbs that extend the sidewalk out to the traffic lane. This permits transit to stop in the traffic lane, and eliminates the need to merge out of the stop. Many states also have traffic laws requiring traffic to yield to a bus exiting a zone. Some buses now have prominent flashing yield signs on the left-rear to alert drivers of this requirement.
- **Minor signal pre-emption –** Many of the signals along major arterials are not linked to the signal progressions of intersecting streets. These minor signals typically occur at intersections with minor collectors and pedestrian-activated crosswalks. While these signals are important to local mobility, the green-time offered to the intersecting street is typically a policy minimum, and there are few side effects from delaying it to prevent minor signals from delaying a bus.

- Minor signal pre-emption can be implemented with the same technology as a garage-door opener, where a driver simply presses a button to alert the signal of the bus's presence. Alternatively, it can use more sophisticated sensing devices based on Automatic Vehicle Location systems. In either case, the purpose is simply to pre-empt the green-time of the intersecting street or crosswalk just long enough for the bus to get through. The result does not disrupt the signal progression of the main arterial, because it simply extends the "greentime" of a minor signal; the minor signal would still be red for the arterial only when the progression dictates. Of course, the pre-emption should not interrupt pedestrian-activated crosswalks once the pedestrian has been given a WALK signal, but it can delay the WALK signal until the next logical point in the arterial's signal progression. While this may sometimes cause running passengers to miss a bus, this tool is for use only on high-frequency lines where the next bus will be coming soon. It can also be de-activated in the evenings when frequencies are poorer and rapid pedestrian access is a higher priority relative to operating speed.

- **Queue Bypasses at Major Signals –** It is often not practical for transit to preempt signals at the intersection of two arterials, because the intersecting arterial may have its own signal progression that cannot be disrupted without unacceptable traffic impacts. At these intersections, a common tool is the queue bypass. In this arrangement, the right lane approaching the intersection is reserved for buses and right-turning traffic. A special brief signal phase gives a green light to this right lane only, while also giving a red light to the crosswalk to which right-turning traffic would otherwise yield. This permits the right lane to clear out and for the bus to cross the intersection prior to the parallel queued traffic on the arterial. Queue bypasses require careful study, but are often an effective solution to moving transit through major intersections where delays can otherwise be severe.

- **Bus-Only Lanes and HOV Lanes –** The highest-benefit and highest-impact solution to bus operating speed problems is the bus-only lane or bus/HOV lane. Many cities eliminate parking during high-demand hours to create a bus/HOV lane, though not all of these are properly enforced. Full bus/HOV lanes on arterials can be appropriate especially in very high-frequency corridors. Of course, these lanes dramatically impact the capacity of the street for traffic and parking, and typically require a well-established sense of urgency about the transit speed problem – another reason for policy operating speeds on the Primary Transit Network.

Marketing the PTN for Maximum Ridership

The Primary Transit Network – including the highest-volume peak express routes, will – when completed regionwide – carry the heaviest passenger loads at the greatest level of convenience. This convenience should be marketed.

Primary Services should have a different "look and feel" than the rest of the system. While the buses may be the same, many physical features of the bus stop can help make the PTN stand out and advertise its exceptional usefulness. During the decade or more when the PTN is still restricted to a few corridors, the City should consider:

- Distinctive design for Primary Transit Network shelters (building toward the long term shelter plan.)
- Amenities at or near shelters that give value to waiting time, including phones, newsracks, and other fast vending opportunities.
- Distinctive signage for PTN lines, providing much more information than the current generic bus stop and advertising "15-minute service" or "the bus will be here soon!"
- Distinctive look for schedule information on high-frequency lines.
- A new approach to the system map, using colors to emphasize frequency, *as N\N does in the maps in this report.* Most transit maps, including Fresno's, make no effort to distinguish intense services from infrequent ones. The resulting map, like most in the industry, is analogous to a road map that doesn't distinguish between a freeway and a dirt road.

Land Use and the PTN

The City has a variety of land use and transportation goals that will be met or defeated through the cumulative effect of many land use decisions. The goal of reducing sprawl requires that better use be made of underutilized land within the existing built area. The Primary Transit Network can be a crucial tool to that end.

The City should encourage density and other transit-friendly development types along the PTN, and discourage them in places that are hard for transit to reach. The PTN corridors should also carry building orientation and pedestrian accessibility requirements for all new development, so that the development that occurs is convenient to the transit rider. In general, the PTN should be a focal point for the entire arsenal of transit-oriented development practices, to maximize the value of the investment that the agency has already made in these corridors.

Finally, all new transit-dependent land uses, such as social service offices, should be located on the PTN as a matter of policy. Frequently, social service agencies locate on the cheapest available land, which usually has poor transit access. While this may optimize costs for the agency in question, it forces the transit agency to run an inefficient service to reach a poorly sited facility. In effect, one agency is simply dumping its costs on another. The same is true for junior high and high schools, and of course all institutions of higher education that have any commuter market.

Expanding the PTN

A Primary Transit Network should provide not just for intensification of land use around existing PTN services. It should also promote the development of new PTN corridors contingent on land use plans that will provide the ridership needed to support primary service. This element of the PTN strategy is critical for extending Primary service into areas where the current densities and development patterns cannot support high-frequency service by themselves.

A PTN policy should identify three types of Primary corridor:

1. **Existing PTN –** These corridors already have the densities needed to support PTN service, though further intensification is encouraged, and they already have service at 15-minute headways all day. At the moment, there are no such services, but the short term plan begins to create them, and these would be the backbone for future growth. Barring a major loss of resources, the Existing PTN will not be scaled back in the future. This commitment – which can be amplified by major capital investments – can help to give the PTN some of the permanence that is currently associated with Light Rail, and can therefore enable the PTN to stimulate developer confidence in transit-oriented development.
2. **Planned PTN –** These corridors have the densities to support PTN service, and they are Fresno's next priorities for upgrading to PTN levels of service as resources permit.
3. **Candidate PTN –** These corridors have PTN-supportive densities that are zoned but not sufficiently built. They may also have problems of building orientation that need to be improved over time. Here, there would need to be an agreement that:
   - IF the area actually develops with adequate densities and building orientation, AND
   - IF the jurisdiction controlling the roadway supports including transit speed protection in its street classification policies,
   - THEN the candidate PTN corridors will be upgraded to Planned, and implemented as Fresno's resources permit.

The process of expanding the PTN provides a way of breaking out of the chicken-and-egg cycle that frustrates transit-oriented development in suburban areas. Typically, existing transit in these areas is poor, and developers want to see the transit in place, preferably with some permanence, before they will develop in a transit-dependent way, encouraging the development of new high-ridership corridors where none exist today.

APPENDIX A

1999 RESIDENTIAL DENSITY BY TAZ
1999 EMPLOYMENT DENSITY BY TAZ
2020 RESIDENTIAL DENSITY BY TAZ
2020 EMPLOYMENT DENSITY BY TAZ

Figure A-1 Map 1 – 1999 Residential Density by TAZ

[Graphics file]

Figure A-2 Map 2 – 1999 Employment Density by TAZ

[Graphics file]

Figure A-3 Map 3 – 2020 Residential Density by TAZ

[Graphics file]

Figure A-4 Map 4 – 2020 Employment Density by TAZ

[Graphics file]

APPENDIX B

ROUTE-BY-ROUTE DESCRIPTIONS

Route 9 — Shaw Avenue Crosstown

Route 9 – Shaw Avenue Crosstown

	Weekdays	Saturday/Sunday
Operating Span	5:40 AM to 10:30 PM	6:30 AM to 7:10 PM
Peak Frequency	30	30
Peak Buses	4	4

On-time Performance	
Early	10%
On-time	83%
Late	7%

	FY 1999/2000	FY 2000/2001
Revenue Hours	18,932	19,338
Boardings	685,324	725,636
Productivity	36.2	37.5

Route Description

Route 9 is a crosstown route that runs east/west along Shaw Avenue from the Fresno State area to just west of Interstate 99. Service on this route is offered on 30-minute headways from about 5:40 AM to 10:30 PM weekdays. Route 9 provides connection to several shopping areas along Shaw including the Fashion Fair Mall as well as educational centers such as CSU-Fresno and the Central Adult School.

Boarding Activity

The heaviest boardings on Route 9 occur between Blackstone and CSU-Fresno where there are several stops near or over 100 boardings per day. The highest concentration is at the intersection of First and Shaw where Route 9 intersects with routes 28, 29 and 34 (over 350 boardings per day). Other significant boardings occur along Shaw at West and Palm where Route 9 intersects with routes 22 and 26, respectively. Boardings for this route tend to mirror the employment/population index for each area where heavier boardings are concentrated in areas of high residential and employment density. Boardings also tend to be heavy where Route 9 intersects with other FAX routes.

Comments and Observations

Drivers noted that Route 9 has a tight schedule. Shaw Avenue between Golden State and Cedar is often congested during peak travel hours, taking the bus off schedule. Route 9 is one of two routes in the FAX system that does not connect to a transit center or The Market Place.

INSERT ROUTE 9 MAP

Route 20 – N. Hughes, N. Marks, E. Olive

ROUTE 20 – N. HUGHES, N. MARKS, E. OLIVE

	Weekdays	Saturday/Sunday
Operating Span	5:10 AM to 10:20 PM	6:40 AM to 7:10 PM
Peak Frequency	30	50
Peak Buses	5	3

On-time Performance	
Early	6%
On-time	86%
Late	8%

	FY 1999/2000	FY 2000/2001
Revenue Hours	22,322	22,854
Boardings	955,364	1,007,788
Productivity	42.8	44.1

Route Description

Route 20 is a long circuitous route running southeast/northwest from a shopping area near Brawley and Shaw to Belmont and Clovis, south of the Fresno-Yosemite International airport. Service is offered on 30-minute headways from about 5:10 AM to 10:20 PM weekdays. Route 20 provides connection to several major destinations including Fresno Freshman High School, Fresno High School, Fresno City College, the Downtown Transit Center, Juvenile Hall, Valley Medical Center, Roosevelt High School and the County Fairgrounds.

Boarding Activity

The route has three areas of heavy daily boardings: along McKinley near the Fresno High School and Fresno City College (over 300); at the Downtown Transit Center (750); and at Cedar and Ventura (over 500) which is in the immediate vicinity of the Fresno County Fairgrounds, University Medical Center and Roosevelt High School. Other significant boardings occur along Olive at Chestnut and Peach, at Hughes and Dakota and at the shopping center near Shaw and Brawley. Boardings for this route are concentrated in areas with a high employment/population index and at education centers. As with many routes in the FAX system, boardings are particularly heavy at the Downtown Transit Center.

Comments and Observations

Drivers comment that the schedule for Route 20 is tight. The route has consistently heavy boardings and covers several major destinations, making it easy for the driver to get behind schedule.

INSERT ROUTE 20 MAP

Route 22 – N. West Avenue,
E. Tulare Avenue

Route 22 – N. West Ave, E. Tulare Ave

	Weekdays	Saturday/Sunday
Operating Span	5:20 AM to 10:30 PM	6:15 AM to 7:15 PM
Peak Frequency	30	50
Peak Buses	5	3

	FY 1999/2000	FY 2000/2001
Revenue Hours	22,616	23,252
Boardings	972,496	1,012,678
Productivity	43.0	43.6

On-time Performance	
Early	6%
On-time	91%
Late	3%

Route Description

Route 22 runs southeast/northwest from Bullard and Marks to Southeast Fresno around the Village Green and Sunnyside Country Clubs. Service is offered on 30-minute headways from about 5:20 AM to 10:30 PM during weekdays. Route 22 provides service to major destinations such as the Downtown Transit Center and Roosevelt High School.

Boarding Activity

Boardings on the route are high but not very concentrated. The heaviest boardings occur at the Downtown Transit Center (over 850) and at the intersection of Tulare and Cedar (300) where Route 22 intersects with Route 38 and where Roosevelt High School is located. Both of these spots are adjacent to areas with very high employment and residential densities. Other significant boardings occur at the various locations where Route 22 intersects with other FAX routes at major intersections. Most of these also have medium to high population/employment densities, with the exception of the intersection of Peach and Tulare where the 22 intersects with Route 26.

Comments and Observations

Driver comments and on-time performance indicate that Route 22 is not very difficult. While the route has high overall boardings and productivity, the boardings are spread evenly along the route.

Insert route 22 map

Route 26 – North Palm, Peach Avenue

Route 26 – North Palm, Peach Avenue

	Weekdays	Saturday/Sunday
Operating Span	5:55 AM to 10:45 PM	7:15 AM to 7:30 PM
Peak Frequency	30	60
Peak Buses (26/39)	9	4

On-time Performance	
Early	12%
On-time	86%
Late	2%

	FY 1999/2000	FY 2000/2001
Revenue Hours	34,119	34,821
Boardings	1,528,551	1,569,676
Productivity	44.8	45.1

Route Description

Route 26 runs in a backwards 'J' shape. Starting from the Fresno-Yosemite International airport it runs south along Peach before going into the Downtown Transit Center via Butler and then north along Palm and eventually into the Market Place shopping and entertainment area. Service is offered on 30-minute headways from about 5:55 AM to 10:45 PM. Route 26 also connects to other major destinations such as Pacific College, Mosqueda Community Center, County Fairgrounds, Fresno Freshman High School, Fresno High School and Bullard High School.

Boarding Activity

The heaviest boardings on this route occur at the Downtown Transit Center (almost 700 boardings) and along Butler at Cedar and Chestnut (both over 150). Route 26 has several other areas with a high number of daily boardings. These are located primarily at major street intersections adjacent to areas with high employment and residential population or where Route 26 intersects with other FAX routes.

Comments and Observations

Route 26 interlines with Route 39 at the Fresno Yosemite International Airport. These are the only routes in the FAX system that interline. The recent addition of another bus to Route 26/39 has alleviated problems with buses running late. In fact, recent on-time performance indicates buses are arriving early 12% of the time, as opposed to being late only two percent.

INSERT ROUTE 26 MAP

Route 28 – CSU-Fresno, Manchester Center, Ventura Avenue

Route 28 – CSU-Fresno, Manchester Center, Ventura Avenue

	Weekdays	Saturday/Sunday
Operating Span	5:45 AM to 11:35 PM	6:15 AM to 7:30 PM
Peak Frequency	30	30
Peak Buses	7	6

	FY 1999/2000	FY 2000/2001
Revenue Hours	34,112	33,123
Boardings	1,620,347	1,663,804
Productivity	47.5	50.2

On-time Performance	
Early	9%
On-time	89%
Late	2%

Route Description

Route 28 runs in a semi-circle from the Sierra Vista Mall along Shaw in the City of Clovis to Kings Canyon and Peach in southeast Fresno. Along the way the route connects with the Manchester and Downtown Transit Centers. Service is offered on 30-minute headways from about 5:45 AM to 11:35 PM. Major destinations include CSU-Fresno, Fashion Fair Mall, Sierra Community Hospital, Fresno High School, Fresno City College, Juvenile Hall, Valley Medical Center, the County Fairgrounds, Pacific College and Sunnyside High School.

Boarding Activity

Route 28 has the highest annual boardings and is the most productive of all the FAX routes. Several stops have high average daily boardings. In particular, the 28 is busy at the Manchester Transit Center (over 500 boardings), the Downtown Transit Center (700) and along Kings Canyon between Cedar and Maple (300). Other high boardings areas include the intersection of First and Shaw (over 200), Wishon and Maple near Fresno High and Fresno City College (over 200), Kings Canyon and Chestnut (130), Kings Canyon and Peach (115), and Peach and Shaw (110). The high boardings on the 28 are consistent with the high density areas and major destinations it serves as well as the large number of transfer opportunities it provides.

Comments and Observations

Despite the high boardings and productivity, most buses are able to maintain good on-time performance. Drivers agree that the 28 is busy but the schedule is adequate. Route 28 provides the only local connection between Fresno and Clovis.

INSERT ROUTE 28 MAP

Route 29 – UMC, Downtown, MTC, CSU-Fresno Express

Route 29 – UMC, Downtown, MTC, CSU-Fresno Express

	Weekdays	Saturday/Sunday
Operating Span	6:45 AM to 6:10 PM	n/a
Peak Frequency	80	n/a
Peak Buses	1	n/a

On-time Performance	
Early	3%
On-time	88%
Late	9%

	FY 1999/2000	FY 2000/2001
Revenue Hours	900	1,835
Boardings	8,278	20,264
Productivity	9.2	11.0

Route Description

Route 29 is an express route with limited stops that serve a lot of the same areas as Route 28. This includes stops at the Valley Medical Center, the Downtown Transit Center, Manchester Transit Center and CSU-Fresno. The service is offered during peak hours with three morning runs and three late afternoon runs spaced about 80 minutes apart. Morning service runs from about 6:45 AM to 11:00 AM. Late afternoon service starts at 2:30 PM and ends at 6:10 PM.

Boarding Activity

Average daily boardings per stop data is not available for Route 29. Annual boarding data for the 29 is low for the FAX system. Productivity was under 10 passengers per hour in fiscal years 1999/2000 and 2000/2001. The low boardings on the 29 are in contrast to the high residential and employment densities of the areas it serves.

Comments and Observations

Despite providing express service connecting some very high density areas, Route 29 has low boardings and productivity compared to other routes in the FAX system. It is possible the odd schedule and lengthy time between runs discourages FAX passengers from using Route 29.

INSERT ROUTE 29 MAP

Route 30 – Pinedale, N. Blackstone, West Fresno

Route 30 – Pinedale, N. Blackstone, West Fresno

	Weekdays	Saturday/Sunday
Operating Span	5:45 AM to 10:05 PM	6:30 AM to 7:25 PM
Peak Frequency	20	30
Peak Buses	7	5

	FY 1999/2000	FY 2000/2001
Revenue Hours	31,029	30,405
Boardings	1,449,045	1,497,906
Productivity	46.7	49.3

On-time Performance	
Early	10%
On-time	87%
Late	3%

Route Description

Route 30 runs north-south from southwest Fresno near the Chandler Downtown Airport through downtown Fresno and then along Blackstone up to the business parks around Friant and Audubon. Route 30 connects to the Downtown Transit Center, the Manchester Transit Center, the Market Place and provides numerous opportunities for transfers to other FAX routes. Route 30 offers service on 20-minute headways from 5:45 AM until around 5:30 PM. It then runs 30-minute frequencies until just after 10:00 PM.

Boarding Activity

Route 30 has the second highest productivity in the FAX system with almost 50 passengers per revenue hour. High daily boardings occur at the Downtown Transit Center (over 900 boardings), the Manchester Transit Center (over 850) and at the intersection of Shaw and Blackstone (200). Several other areas along the 30 have high boardings, including most downtown area stops, on Blackstone near Fresno City College and on Blackstone from Ashlan to Dakota. Boardings on this route closely mirror the employment/population index for each area where heavier boardings are concentrated in areas of high residential and employment density.

Comments and Observations

Route 30 is the only route in the FAX system offering frequencies higher than 30 minutes at any time. While on-time performance on Route 30 is good, drivers note the route has a very tight schedule that is difficult to maintain.

Insert route 30 map

Route 32 – N. Fresno, Manchester Center, W. Fresno

Route 32 – N. Fresno, Manchester Center, W. Fresno

	Weekdays	Saturday/Sunday
Operating Span	5:55 AM to 10:45 PM	6:15 AM to 7:05 PM
Peak Frequency	30	30
Peak Buses	5	5

	FY 1999/2000	FY 2000/2001
Revenue Hours	25,274	25,790
Boardings	1,139,848	1,213,916
Productivity	45.1	47.1

On-time Performance	
Early	4%
On-time	92%
Late	4%

Route Description

Route 32 runs north-south from residential neighborhoods in south Fresno to the Market Place in north Fresno. Along the way it connects to the Downtown Transit Center, serves commercial and residential areas along Fresno Boulevard, and connects to the Manchester Transit Center. Other major destinations served include Edison High School, San Joaquin High School, Fresno Community Hospital, VA Medical Center, Sierra Community Hospital, Fashion Fair Mall, Fresno Surgery Center, San Joaquin Valley College, and Kaiser Hospital.

Boarding Activity

The heaviest boardings occur at the Downtown Transit Center (almost 750 boardings) and the Manchester Transit Center (over 500). Other high boarding areas include Fresno Blvd around I-99, Fresno and Olive, Fresno and Clinton, and Fresno and Shaw. The boardings are fairly consistent with areas of high residential and employment densities as well as stops with transfer opportunities.

Comments and Observations

Drivers note that Route 32 has a high number of wheelchair boardings which can make the schedule difficult to maintain. This is not surprising as the route serves a neighborhood in southwest Fresno with many older residents and also connects to five major hospitals. Despite the wheelchair boardings, Route 32 maintains very good on-time performance.

Insert route 32 map

Route 33 – Olive, Belmont Crosstown

ROUTE 33 – OLIVE, BELMONT CROSSTOWN

	Weekdays	Saturday/Sunday
Operating Span	6:00 AM to 10:15 PM	7:45 AM to 7:00 PM
Peak Frequency	35	45
Peak Buses	3	2

On-time Performance	
Early	7%
On-time	89%
Late	4%

	FY 1999/2000	FY 2000/2001
Revenue Hours	12,468	12,725
Boardings	473,786	505,524
Productivity	38.0	39.7

Route Description

Route 33 runs east-west along Olive and Belmont, north of downtown Fresno. The 33 provides crosstown service and is one of two FAX routes that does not connect to the Downtown or Manchester Transit Centers. Service runs on 35-minute frequencies from 6:00 AM to 10:15 PM. Major destinations served by the 33 include Addams Elementary School, San Joaquin High School, Community Center, and the Chaffee Zoological Gardens.

Boarding Activity

The heaviest boardings on the 33 occur where it intersects with other FAX routes at Fruit, Palm, Blackstone, Fresno, and Cedar. Despite being one of the less productive FAX routes, Route 33 still has productivity near 40 passengers per revenue hour. The boardings tend to be concentrated at areas with high densities as well as transfer opportunities.

Comments and Observations

One driver recommends extending the 33 east to Chestnut to serve apartments in the area. Route 33 is the only route in the FAX system running on a 35-minute frequency. This creates an awkward schedule that may deter some potential riders.

Insert route 33 map

Route 34 – NE Fresno, North First, West Fresno

Route 34 – NE Fresno, North First, West Fresno

	Weekdays	Saturday/Sunday
Operating Span	5:40 AM to 10:10 PM	6:45 AM to 7:35 PM
Peak Frequency	30	30
Peak Buses	5	5

On-time Performance	
Early	10%
On-time	88%
Late	2%

	FY 1999/2000	FY 2000/2001
Revenue Hours	12,468	25,050
Boardings	473,786	1,009,254
Productivity	38.0	40.3

Route Description

Route 34 runs north-south primarily along the First Street corridor. Service is provided to the West Fresno neighborhood, Downtown Fresno and through high density areas along First Street up to northeast Fresno. Major destinations include the Fashion Fair Shopping Center, Politi Library, Hoover High School, and St. Agnes Medical Center.

Boarding Activity

The heaviest boardings occur at the Downtown Transit Center (600 boardings), California and Elm (140), First and Shields (200), the Fashion Fair Shopping Center at First and Shaw (200) and at Hoover High School near First and Barstow. Several other stops at major intersections on the route regularly have over 50 boardings in a day. The heaviest boardings tend to closely correspond to areas with high residential and employment density.

Comments and Observations

Drivers suggest working on the schedule for Route 34 to optimize timed transfer opportunities with cross-town routes such as 9 and 33.

INSERT ROUTE 34 MAP

Route 38 –North Cedar, Jensen, Hinton Center

Route 38 – North Cedar, Jensen, Hinton Center

	Weekdays	Saturday/Sunday
Operating Span	5:45 AM to 11:10 PM	6:45 AM to 7:40 PM
Peak Frequency	30	30
Peak Buses	6	6

On-time Performance	
Early	15%
On-time	83%
Late	2%

	FY 1999/2000	FY 2000/2001
Revenue Hours	30,068	30,653
Boardings	1,368,090	1,390,806
Productivity	45.5	45.4

Route Description

Route 38 starts from the Downtown Transit Center, through west Fresno, along Jensen to the Calwa neighborhood. From the Calwa neighborhood, the main portion of the route runs north-south along Cedar to Nees and then connects to The Marketplace. Route 38 serves several major educational destinations such as Edison High School, Roosevelt High School, McLane High School, Duncan Polytechnic High School, Cedar Clinton Library, Hoover High School, CSU-Fresno and the West Coast Bible College. Service is offered on 30-minute frequencies from about 5:45 AM to 11:10 PM.

Boarding Activity

Route 38 has several stops with heavy boardings that closely correspond to areas of high residential and employment density. The heaviest boardings occur at the Downtown Transit Center (over 400 boardings), along Cedar from Butler to Tulare near the Fairgrounds, Valley Medical Center and Roosevelt High School (over 600 total), at Cedar and Olive (200), Cedar and Clinton (200), Cedar and Shields (over 200) and Cedar and Shaw (300) near CSU-Fresno. Several of the heavy boardings areas also correspond with major trip generators such as schools and intersections with other FAX routes.

Comments and Observations

Route 38 has a high occurrence of early arrivals. At 15%, the incidence rate is high enough to indicate a need for schedule adjustment.

INSERT ROUTE 38 MAP

Route 39 – Clinton Avenue Crosstown

Route 39 – Clinton Avenue Crosstown

	Weekdays	Saturday/Sunday
Operating Span	5:30 AM to 10:20 PM	7:30 AM to 7:25 PM
Peak Frequency	30	60
Peak Buses (26/39)	9	4

On-time Performance	
Early	12%
On-time	86%
Late	2%

	FY 1999/2000	FY 2000/2001
Revenue Hours	34,119	34,821
Boardings	1,528,551	1,569,676
Productivity	44.8	45.1

Route Description

Route 39 runs east-west along Clinton Avenue from the Fresno-Yosemite International Airport to the Central Adult School at Brawley and Shields with a connection to the Manchester Transit Center in between. Major destinations served include Fresno Freshman High School, Fresno High School, Fresno City College, University Medical Center, McClanne High School, and the Cedar Clinton Library. Service is offered on 30-minute headways from 5:30 AM to 10:20 PM.

Boarding Activity

The heaviest boardings occur at the Manchester Transit Center (almost 400 boardings) and at the intersection of Marks and Clinton (150). Other heavy boardings occur at Clinton and Fresno (100), Clinton and First (100) and Clinton and Cedar (100) where the 39 connects to FAX Routes 32, 34 and 38 respectively. The stops with heavy boardings also tend to correspond to areas with high residential and employment density.

Comments and Observations

Route 39 is part of the Route 26/39 interline. These are the only two interlined routes in the FAX system. The recent addition of a bus to the interlined routes has improved on-time performance. In fact, buses are running early more often than late.

Insert route 39 map

Route 41 – North Marks Avenue, Shields Avenue, VMC

Route 41 – North Marks Avenue, Shields Avenue, VMC

	Weekdays	Saturday/Sunday
Operating Span	5:40 AM to 10:35 PM	7:05 AM to 7:30 PM
Peak Frequency	30	50
Peak Buses	5	3

On-time Performance	
Early	7%
On-time	87%
Late	6%

	FY 1999/2000	FY 2000/2001
Revenue Hours	20,548	22,209
Boardings	930,812	974,232
Productivity	45.3	43.9

Route Description

Route 41 runs northwest to southeast along Shields and Chestnut. The route serves northwest Fresno, the Manchester Transit Center, parts of east Fresno and the Malaga neighborhood in southeast Fresno. Major destinations served by Route 41 include Pacific College, Mosqueda Community Center, California Christian College, Duncan Polytechnic High School, and McLane High School. Service is offered on 30-minute headways from 5:40 AM to 10:35 PM.

Boarding Activity

Route 41's heaviest boardings occur at the Manchester Transit Center (500 boardings), Cedar and Shields (230) where the Duncan Polytechnic High School and an intersection with Route 38 are located, and at Shields and Scandinavian Middle School (200). Other heavy boardings occur where Chestnut intersects with Tulare, Kings Canyon and Butler. These three intersections provide connections with other FAX routes and are adjacent to areas with high residential and employment densities.

Comments and Observations

None.

Insert Route 41 map

Route 45 – Ashlan Crosstown

Route 45 – Ashlan Crosstown

	Weekdays	Saturday/Sunday
Operating Span	6:00 AM to 9:00 PM	9:35 AM to 6:25 PM
Peak Frequency	60	60
Peak Buses	3	3

	FY 1999/2000	FY 2000/2001
Revenue Hours	12,210	12,296
Boardings	286,936	310,016
Productivity	23.5	25.2

On-time Performance	
Early	9%
On-time	88%
Late	3%

Route Description

Route 45 runs a circuitous crosstown pattern from east Fresno to northwest Fresno serving Ashlan, the Manchester Transit Center, Fresno High, Fresno City College, Gillis Library and Bullard High in between. Service is offered on 60-minute headways from about 6:00 AM to 9:00 PM.

Boarding Activity

The heaviest boardings on Route 45 occur at the Manchester Center (150 boardings). Other areas with a decent number of boardings include Ashlan and Cedar (60) and the stops around McKinley near Fresno High and Fresno City College. Overall boardings and productivity for this route are low compared to other FAX routes. This is consistent with the relatively low to medium residential and employment densities served by the route.

Comments and Observations

The east and west ends of Route 45 provide coverage to some low to medium density areas that need some service. The middle portion of the route, however, meanders in a manner that appears unnecessarily unproductive. This route should be reviewed to ensure it is serving trips in the most productive manner possible while still providing coverage services.

Insert route 45 map

Route 58 and 58E – NE Regular Service and Valley Children's Hospital Express

Route 58 and 58E – NE Regular Service and Valley Children's Hospital Express

	Weekdays	Saturday/Sunday
Operating Span	6:50 AM to 6:40 PM	n/a
Peak Frequency	60	n/a
Peak Buses	1	n/a

	FY 1999/2000	FY 2000/2001
Revenue Hours	2,995	2,984
Boardings	24,556	26,660
Productivity	8.2	8.9

On-time Performance	
Early	7%
On-time	74%
Late	19%

Route Description

Route 58 connects the Market Place and Clovis West High. Several transfers are available for connection to Fresno and Clovis from the 58. Route 58E provides a direct connection from the Market Place to the Valley Children's Hospital in north Fresno via Highway 41. There are no stops between the two endpoints of the route. Service is offered on weekdays only with 60-minute headways from 6:20 AM to 6:40 PM.

Boarding Activity

Average daily boarding data is not available for the 58/58E. Annual boardings are low compared to the rest of the FAX system and productivity is under ten boardings per revenue hour.

Comments and Observations

Though no drivers mentioned the 58/58E as having a tight schedule, it has the highest percentage of late arrivals in the FAX system.

Insert route 58 and 58E map

Route 59 – Valley Children's Hospital, Marketplace, MTC Express

ROUTE 59 – VALLEY CHILDREN'S HOSPITAL, MARKETPLACE, MTC EXPRESS

	Weekdays	Saturday/Sunday
Operating Span	n/a	11:00 AM to 6:25 PM
Peak Frequency	n/a	60
Peak Buses	n/a	1

On-time Performance	
Early	9%
On-time	87%
Late	4%

	FY 1999/2000	FY 2000/2001
Revenue Hours	761	803
Boardings	1,827	1,640
Productivity	2.4	2.0

Route Description

Route 59 is a weekend only express service with stops at the Valley Children's Hospital, the Market Place and the Manchester Transit Center. Service runs on 60-minute headways from 11:00 AM to 6:25 PM. Annual boardings are the lowest in the FAX system with productivity under five passengers per revenue hour.

Boarding Activity

No stop level boarding data is available for Route 59.

Comments and Observations

Ridership on Route 59 is low but it provides an important public service by connecting to the Valley Children's Hospital.

Insert route 59 map